Educating for Community Resilience: How the Work of Thomas Homer-Dixon and John Dewey's Pattern of Inquiry Can Help Us Prepare for the Ecological and Social Challenges of the 21st Century

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Abstract

Scientists have overwhelmingly concluded that global warming occurs as a consequence of human activities and that climate change, combined with the depletion of resources, could have catastrophic consequences for the human civilization later this century. However, in political circles and in the public sphere these conclusions are not taken seriously, or they are laid aside for future generations to deal with; at the same time, significant efforts are being deployed to discredit the scientific evidence. In this thesis I have studied the positions of climate scientists as well as those of climate change deniers, and I also examined how their points of view are likely to impact the interests and habits of corporations and citizens. The work of Thomas Homer-Dixon was used as an important source for analyzing the complex interaction between our natural, economic, and social systems, and John Dewey's pattern of inquiry provided the theoretical foundation for an analysis of the current crisis and its possible solutions. No concerted action to deal with climate change has yet been taken by the leaders of the Western world; I corroborated data from four reliable sources (Hansen, 2009; IPCC, 2007; Lynas, 2007; Steffen, 2011) regarding several development scenarios and their likely consequences on greenhouse gas emissions, and I concluded that a future temperature increase of more than 2°C appears now as unavoidable. In the light of this conclusion I argue that education for increasing the resilience of smaller communities is a realistic alternative that can offer some hope in dealing with the challenges ahead.

***Keywords**: education for community resilience; global warming; resource depletion; climate change deniers; social action.*

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Dedication

For Meredith and Claudia

In loving memory of Olga

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CHAPTER ONE: INTRODUCTION

Whatever happens in this uniquely crucial century will resonate into the remote future and perhaps far beyond the Earth. (Martin Rees, 2005).

Storytelling is powerful, in part because in a story everything is linked: The characters, the plot, the setting are parts of a whole and are reflected in one another. As we read the introduction, our curiosity is enticed, and the plot develops before our eyes; we are separated from it, and yet we are drawn and participate in the flow of events that will eventually lead the story to its conclusion.

One story that I remember (I believe it is from the *Arabian Nights*) recounts the adventures of a princess who was living happily in a beautiful palace with her charming prince. Once every month, the prince needed to leave for the night, and the princess had to wait dutifully for his return (one may wonder why in many stories women are described either as passive characters or as villains). She was allowed to go into 99 of the 100 rooms of the castle, and she took turns in doing so—they were filled with all the wonders one can imagine. However, after a while she knew every room by heart and was looking for new things to do. . . . As we read, we know, or rather feel that the princess will end up going into the forbidden room—and so she does. This is the beginning of some very scary adventures, which we read hoping for a happy ending.

Different meanings can be drawn from this story, but here I would like to retain the one that emphasizes cautiousness, heeding of warnings. As we head toward an extremely challenging future, many of us get the feeling that something is amiss. Our technical prowess, at least in the developed world, is omnipresent and can make us feel

very proud and powerful. Sometimes this pride is justified—such as in the case of the amazing rescue of 33 Chilean miners who were trapped for 69 days at 2,000 feet below the surface of the earth. Chilean President Sebastian Pinera waited personally for the miners to come out, and Bolivian President Evo Morales waited for the appearance of one of his nationals; the Pope, U.S. President Barack Obama, and other top dignitaries sent messages of congratulation (Burleigh, 2010).

Yet such an event, uplifting as it may be, is a lone occurrence today, and most likely the enthusiasm that it inspired will be short lived. We are inundated daily with all kinds of bad news; many of them relate to the fact that the global economy is in the grips of an unprecedented and protracted recession. This is *the* most important issue and has been so for almost 3 years. It has single-handedly pushed back every other priority, including one that in my opinion is shaping as one of the biggest challenges ever faced by our civilization: climate change.

Should it be so? Do we have to keep focusing on the economy at the expense of everything else? What are the effects of our lifestyles on our well-being, as individuals and as a society? What are the effects of our lifestyles on nature? Are there any other (better) choices? If yes, what can empower us in making those choices? Can education and philosophy make a contribution toward charting a different path? These are some of the questions that will be examined in this thesis.

Chapter Two examines an interlocking pattern of unexamined social and economic habits that make our civilization unsustainable. I have identified some of the components of this pattern as being the following: consumerism, globalization, economic growth, new technologies, the Internet and the new communication media,

virtual worlds, and celebrities. These issues have originated in the Western world and will be often referred to as "Western" problems; however, they have become global problems because the populations of other countries such as Brazil, Russia, India, and China are becoming more affluent and try to copy the Western lifestyle.

Chapter Three argues that the path currently followed by our civilization is likely to lead to societal collapse due to resource exhaustion, severe environmental degradation, and the consequences of climate change.

Chapter Four analyzes why people living in the Western world, and their society as a whole, seem to be unable to question their choices. An important contributor to this inability is the increasing power of many corporations and their subsequent influence on the political sphere. These corporations promote their interests ahead of (and often against) the common good; in the context of our current crises, the fossil fuel energy corporations are particularly destructive, as they use their funds and influence to sow doubt about climate change and delay effective actions to prevent its consequences (Hamilton, 2010; Hoggan, 2009). Other factors that contribute to this inability are the following: our belief in the "omniscience" of the markets, in spite of their repeated and lamentable failures; the decline of the middle class and the phenomenon of poverty; and the decline of democracy. At a conceptual level, these factors may be consequences of cultural errors: the belief that humans are separated from nature; the belief that men are superior to women; and a hierarchy based on power and domination (Hartmann, 2009, pp. XIII-XIV). One of the conclusions of this chapter is that constructive change may be implemented more effectively within smaller communities.

The failure of the Western world to guide humanity toward a sustainable future and the alternative of community efforts guided by John Dewey's method of inquiry are two very important ideas that underlie this thesis. However, such ideas face important criticisms. On the one hand, it has been argued that humans, according to many indicators, are doing better than ever before and, in spite of significant difficulties, have the capacity to chart a better future (Ridley, 2010); on the other hand, it has been argued that we cannot deal successfully with climate change unless our efforts are applied on a worldwide scale (Stern, 2009). John Dewey's model of inquiry has also been criticized, and I will address two criticisms pertaining to it. One criticism comes from Bowers (1993), who views John Dewey's model of inquiry as embedded in Western anthropocentrism and therefore inadequate to guide future ecological thinking (Bowers, pp. 91–105); the other comes from Russell (1939/1951, 2005), who considers that John Dewey's model of inquiry introduces an unacceptable relativism regarding the notions of truth and knowledge. Chapter Four analyzes and discusses all these criticisms.

Chapter Five examines how we can increase the resilience of smaller communities and prepare them to be more successful in dealing with the challenges of climate change and resource exhaustion. In this context I analyze two themes using the framework of John Dewey's pattern of inquiry. The first theme concerns our current response, as a civilization, to the challenges posed by climate change and resource exhaustion. The second theme concerns the process of developing this thesis and why I decided to change my focus from educating for ecological responsibility to educating for community resilience. In this chapter, I also discuss a practical application of my

ideas for increasing community resilience by creating a nonprofit educational organization. This organization will have two main purposes: to educate smaller communities on the scientific aspects of climate change and resource exhaustion and to work with them in their search for solutions. Chapter Five also discusses the limitations of my work.

This thesis started as an attempt to better understand the present and future challenges faced by our society. I am the parent of a young child, and I want to contribute to the education of my daughter in a way that will help her deal with the challenges she is likely to face when she is an adult. The initial purposes of my thesis were to bring arguments for increased ecological responsibility and to develop an ecological responsibility program for community colleges. However, after examining the work of Thomas Homer-Dixon and several other authors, I came to the conclusion that I needed to redefine some of my basic assumptions. Following this process, which is presented in detail in Chapter Five, I have changed my focus from educating for ecological responsibility to educating for community resilience. This is a significant shift and reflects my assessment of a severe discrepancy between the seriousness of the climate change crisis and the generally meagre and unco-ordinated efforts that are being deployed in order to deal with it.

I have studied in detail and will often refer to the work of Homer-Dixon because he writes from a large, interdisciplinary perspective, and his examination uncovers the complex relationships between nature, society, and economy. John Dewey's method of inquiry is the philosophical foundation of my educational effort for increasing community resilience.

Examining the work of Homer-Dixon together with the work of John Dewey is useful for the educational effort mentioned above, because together these two authors offer a perspective of meaningful analysis and action. Homer-Dixon brings a nuanced and balanced perspective that analyzes the opportunities as well as the threats most relevant to our current phase of economic and technological development; he examines several societal trends and their importance for our future choices and captures the complex and unpredictable character of many natural phenomena. The work of John Dewey has two important features that are valuable in this context: the practical starting point and the melioristic motive (Hildebrand, 2008, pp. 4–5). The practical starting point leads to an objective, unprejudiced examination of our current problems as they are experienced; this approach is valuable because it avoids starting from predetermined premises that are often divisive and can prevent progress. The melioristic motive expresses "the belief that *this* life is neither perfectly good nor bad; it can be improved only through human effort" (Hildebrand, p. 5). My work attempts to contribute to this effort and improve our chances of dealing with the complex challenges of the 21st century.

Two main components, one narrative and the other critical, will weave through the following pages, and each will enrich but also possibly limit my analysis. The critical component reflects my attempt to reason upon the evidence brought forward by many authors. I attempted to analyze objectively the evidence from each source, and I based my judgments on its scientific merit as well as on how well it corroborates with evidence from other sources. This brings strength to my analysis, as long as my attempt was successful. A possible weakness of the critical component is the

bewildering variety of possible sources; a very large number of relevant books and articles were published lately, and many of them bring new and interesting perspectives. Selecting these sources has been sometimes challenging; a further difficulty was brought by the space limitations of this work, which have obliged me to limit my discussions to the most important arguments presented by each author.

The narrative component includes elements of what I learned while working on this thesis, how my perspective evolved, as well as how I have experienced some of the issues that I discuss. This component brings the strength of my personal involvement but can also introduce a weakness due to subjectivity. I tried to limit this weakness by relating my experiences to scientific evidence and to the experiences of other people; if my attempt has been successful, then my experiences could claim a wider significance, and the readers will be the best judges on this matter. Last but not least, this narrative component will tell *my* story through these very interesting times: what I experienced, what I learned, and how I acted.

CHAPTER TWO: . . . AND THEY LIVED HAPPILY EVER AFTER

This is a common ending line of stories, but it is not to be taken literally (not even in a storytelling context). The sentence does not mean the heroes end up living forever, but rather their adventures come to a happy ending. In some stories the heroes try indeed to obtain immortality or eternal youth, but they are not successful; Gilgamesh is a chief example, and there are many others.

Why then are we so convinced that the world as we know it (the developed world, or rather, the developed world seen from the perspective of the rich and powerful) will last forever? It is probably not a conviction, but a desire. It is primarily a desire of the rich and powerful, but also of many of us living in rich countries. It is a desire for certainty, to know that our troubles are over and we have control over our destiny. John Dewey states that "man who lives in a world of hazards is compelled to seek for security" (1929, p. 3); Dewey describes two ways used by people seeking to attain this goal: The first one is to "propitiate the powers" which determine one's destiny and it has "expressed itself in supplication, sacrifice, ceremonial rite and magical cult." The other way "is to invent arts and by their means turn the powers of nature to account" (Dewey, p. 3). Starting with the rise of science, the Western society has experienced a shift from the first method, which tries to change the thinking and emotions of the individual, to the second one, which attempts to change the world. The capitalist system has been an important part of this shift.

The capitalist system represents the dominant social and economic paradigm in the world today. Its story begins in the 16th century (Dillard, 1969, p. 839), during the

same historical period with the rise of science and the increased worldwide prominence of Western Europe. According to Russell (2005):

> Western Europeans were growing rapidly richer, and were becoming lords of all the world: they had conquered North and South America, they were powerful in Africa and India, respected in China and feared in Japan. When to all this were added the triumphs of science, it is no wonder that the men of the seventeenth century felt themselves to be fine fellows, not the miserable sinners that they still proclaimed themselves on Sundays. (p. 495)

Further economic and social developments reinforced these positive feelings. In spite of many vicissitudes, the overall conditions of life of the European population improved, and the autocratic regimes of sovereigns were obliged to sanction the existence of democratic institutions. The main economic engine behind these achievements was the capitalist system, which, in the words of its fiercest critic, had created by the middle of the 19th century "more massive and more colossal productive forces than have all preceding generations together" (Marx, as cited in Dillard, 1969, p. 842).

Impressive as they were at that time, these developments seem merely humble beginnings today; many technological developments that define the modern world were still to come, as was the unprecedented economic growth of the 20th century. This growth has been motivated by economic as well as political reasons. After the Second World War, much of Europe lay in ruins and had to be reconstructed; at the same time, the United States needed to invest in the economic success of Western Europe as a

means of preventing Communist regimes from emerging there and giving the Soviet Union a platform to conquer the whole continent (Judt, 2005, p. 95).

The second part of the 20th century witnessed a fierce confrontation between the capitalist system and its communist counterpart. Even if the victory of the capitalist system seems normal now, it has been uncertain for a long time (Dillard, 1969, p. 845). What I see as a positive part of this victory is the personal and collective opportunity given to people and communities behind the now obsolete Iron Curtain to enjoy (relatively more) freedom and democracy. Conversely, a negative part is the assumption that the capitalist system triumphed because it was "right" (the good heroes end up as winners in most stories); consequently, "the most powerful ideology ever of an inevitable, global, and necessary system of social organization has been rapidly implemented over the globe" (McMurtry, 1998, p. 42). The gravest consequence of this ideology is that it represents "an unprecedented combination of powers distinguished by their totalizing tendencies, powers that not only challenge established boundaries – political, moral, intellectual, and economic . . . – challenge the limits of the earth itself' (Wolin, 2008, p. XV). Challenging the limits of the earth, assuming that we can enjoy infinite growth in a finite world can only lead to collapse.

Such worries were almost nonexistent in 1945; meanwhile, the chief economic and political concern of the Western world was the reconstruction of war-torn Europe. This ignited an era of economic prosperity in which the most important part was played by the large-scale production of the automobile, household appliances, and consumer goods. At the same time, the price of raw materials and food decreased, which has given the West "something of a license to print money" while at the same

time disadvantaging the non-Western countries (Judt, 2005, p. 326). This spectacular economic boom led to a 16-fold increase in worldwide exports between 1950 and 1995 (Judt, p. 326), which have again more than doubled between 1995 and the present day (WTO, 2010). To increase the economic output of the globe more than 32 times in just 60 years without thinking about where this is going to lead seems irrational to me, and yet, economic growth continues to be unquestionable today.

The remainder of this chapter analyzes some of the social, economic, and technological factors that define the unsustainable path our civilization has taken. I briefly discuss the following factors: consumerism, globalization, economic growth, new technologies, the Internet and new communication media, virtual worlds, and celebrities; I conclude with a brief historical review in which I try to explain how capitalism came to be related to democratic and progressive values and why this relationship is now unwarranted.

Consumerism

This economic growth has led to a frenzied consumption incompatible with the Protestant ethos of rationality, frugality, and hard work that had once characterized capitalism; this has been replaced with what was rightly termed an "infantilist ethos" that "generates a set of habits, preferences, and attitudes that encourage and legitimate childishness" (Barber, 2007, p. 81). As it was mentioned very briefly above, in years gone by, capitalism has contributed significantly to the advancement of society; its exploits have benefited everyone and not only the owners of means of production. However, the purpose of consumerism is not to build, but to enable consumers to satisfy their wishes, no matter how whimsical and irrelevant. For this reason,

consumerism lacks social utility—it creates new and fancy wishes for those who can afford them while denying the basics of life to the poor, and it is an important driver behind climate change and the depletion of natural resources. The purpose of selling "puerile goods in a developed world that has few genuine needs" (Barber, 2007, p. 81) has largely been attained, but this was done by cultivating attitudes that encourage senseless consumption and disregard for its consequences.

A good consumer would privilege "impulse over deliberation, feeling over reason, certainty over uncertainty, dogmatism over doubt, play over work, pictures over words, images over ideas, pleasure over happiness, instant gratification over long-term satisfaction, egoism over altruism, private over public," as well as "narcissism over sociability, entitlement over obligation, . . . individualism over community, ignorance over knowledge" (Barber, 2007, p. 83). This "spare portrait of the infantilist ethos" can be reduced "to three archetypical dualisms that capture infantilization: EASY over HARD, SIMPLE over COMPLEX, and FAST over SLOW" (Barber, p. 83).

Acquiring such traits ensures that we are going to keep consuming, but making people dependent on the consumerist lifestyle has the drawback of rendering them unable to make educated choices about their future. John Dewey would likely have characterized this situation as immoral; he wrote:

> Moral progress and the sharpening of character depend on the ability to make delicate distinctions, to perceive aspects of good and of evil not previously noticed, to take into account the fact that doubt and the need for choice impinge at every turn. Moral decline is on a par with the loss of that ability to

> make delicate distinctions, with the blunting and hardening of the capacity of discrimination. (Dewey, as cited in Hildebrand, 2008, p. 72)

Another reason for questioning the morality of the consumerist culture is the indiscriminate aim it takes at anything that can bring a profit, regardless of the consequences. This is not surprising, since corporations are required to place profit above any other consideration; but in doing so, they develop traits that are distinctly antisocial (Achbar & Simpson, 2003). Advertising aimed at children, internet games, and pornography are only three examples. Given a choice, nobody would want marketers to exploit the vulnerabilities of his or her children, to become a computer addict, or to fall victim to the sinister exploitation that underlies the pornography industry.

And yet, through our individual and collective choices we allow many of us to become victims to these ills—for a good profit: Marketing aimed at children is a $12 billion a year industry (Achbar & Simpson, 2003), computer games subscriptions amount to $3.6 billion a year (Barber, 2007, p. 244), and pornography topped $97 billion in revenues in 2006 (Hedges, 2009, p. 58). While the amount spent on advertising in the US in 2005 was $276 billion (Barber, p. 11), the price for protecting *all* the ecosystems of the world was estimated at $270 billion in 2008 (Sukhdev, 2008, p. 38).

Consumerism is also targeting feelings—selling brands is much more profitable than selling just products:

> A transaction is like a one-night stand, and it's never going to be as satisfying or rewarding as falling in love. A transaction makes the cash register ring once.

> A relationship makes it ring again and again. And selling takes on a new dimension when you put it in the context of a relationship. (Travis, as cited in Barber, 2007, p. 169).

Branding uses the force of authentic emotions by designing skilled advertising that attaches them to products and services with the purpose of creating emotional ties and making the consumers faithful to the brands in question. It may be interesting to note that the techniques used in brand advertising can trace their origins to the magical practices of the Italian Renaissance (Couliano, 1987). What the customers likely need are not the products but the qualities associated with them, for example warmth, trustworthiness, liberty, and, of course, love. This could eventually point us in the right direction regarding what we consider important, but such an analysis is not likely to be done often; it would mean questioning an ingrained system that values appearances and considers "keeping up with the Joneses" a worthwhile endeavour.

Branding is very successful in selling products and services. The "bundling together" of products and emotions is a successful sales strategy; however, if for example you feel you can get warmth and acceptance by going to McDonalds, this on the one hand helps selling the burgers, but on the other hand it carries the subliminal message that warmth and acceptance can be bought and sold. Branding can help make individuals and companies more successful, but it also contributes to trivializing emotions and consequently making the society more indifferent and cynical.

Consumerism can also "bundle together" products and services with democratic values by encouraging that people manifest their "liberty" by "voting with their dollars"; and a prime example of mixing consumerism with patriotic feelings has

been given by former U.S. President George W. Bush, who after the 9/11 terrorist attacks urged Americans to continue to enjoy life and keep shopping (Bacevich, 2008). If branding can be seen as an intrusion of consumerism in the emotional sphere, mixing consumerism with values that belong to the public sphere can be seen as an aggression on democracy. Consumers can indeed exercise choices, but from a democratic point of view these choices are trivial; by equating liberty with choosing between two products, democracy is demeaned and the market is seen as able to regulate processes that fall outside its sphere.

Good consumers make disempowered citizens, since their priority is to exercise their most important choices as private individuals. This issue probably extends beyond consumerism and represents an expansion of the private against the public sphere—advocated mainly with the help of an outdated use of the notion of individual liberty, which served a useful purpose in the 18th and 19th centuries but now contributes to denying the very rights it is supposed to promote (Hildebrand, 2008, p. 106). As their expansion progresses, consumerism and capitalism display totalizing tendencies; even if they do not assume the blunt and savage forms of former totalitarian regimes (Wolin, 2008), they are just as dangerous for the long-term prospect of democracy. It is important to expose these tendencies, or otherwise they may end up prevailing—one consumer at a time.

Consumerism cultivates a dulling monotony, which is achieved, paradoxically, through an overwhelming number of (trivial) choices. By subordinating and gradually eliminating a variety of activities in favour of shopping, consumerism contributes to the demeaning of civic life:

> When religion colonizes every sector of what should be our multidimensional lives, we call the result theocracy; and when politics colonizes every sector of what should be our multidimensional lives, we call the result tyranny. So why, it might be asked, when the marketplace – with its insistent ideology of consumption and its dogged orthodoxy of spending – colonizes every sector of what should be our multidimensional lives, do we call the result liberty? (Barber, 2007, pp. 219–220)

A possible answer may be that some options are still preserved, trivial as they are, and, if emphasized over and over and "bundled up" with democratic ideas, they may give the impression that liberty is not lost. In a theocracy or a "classical" dictatorship, there are no alternatives to the official doctrine, and the punishments for acting differently are stiff. The loss of democracy can however take the form of *inverted totalitarianism* (Wolin, 2008), which defines a political system where the citizens are apathetic and submissive, without, however, being overtly oppressed; at the same time, corporate power is unchallenged. Wolin also exposes some of the irrational tendencies that underlie and encourage both consumerism and religious fundamentalism, two prevalent phenomena that have the potential to derail both democracy and our efforts to deal with climate change and resource exhaustion:

> The virtual reality of the advertiser and the "good news" of the evangelist complement each other, a match made in heaven. Their zeal to transcend the ordinary and their bottomless optimism both feed the hubris of Superpower. Each colludes with the other. The evangelist looks forward to the "last days,"

> while the corporate executive systematically exhausts the world's scarce resources. (Wolin, p. 13)

American religious fundamentalism has already been described as a serious threat to democracy due to its radicalism and its desire to destroy those who oppose it (Hedges, 2006, p. 205). This movement would not be able to seize power now, but in case of a major crisis, this eventuality cannot be excluded. Homer-Dixon (2008) notes that "some extreme forms of fundamentalism even encourage their followers to look forward with joy to the wholesale obliteration of both society and nature" (p. 279), and indeed, in the case of severe social and environmental disasters, they could make a strong argument that the end of the world is coming.

We are encouraged to consume the biological inheritance of the earth, without thinking how long it took nature to create it, and we seem largely unaware that "human societies and many natural systems operate on radically different time scales" (Homer-Dixon, 2001, p. 47). At the time of writing, humans are consuming 150% of the resources of the earth, meaning that it would now take the planet one year and a half to regenerate what we consume in one year (Leonard, 2010, pp. 152–153). What would be the likely financial future of a family that makes $100,000 a year and spends $150,000? Bankruptcy? Maybe not; after all, they could get a big pay raise, get an inheritance, or win a lottery. Do similar options exist for the whole planet? I can think of only one, a major energy breakthrough, which could lead to the replacement of fossil fuels with clean energy; however, the likelihood of such a breakthrough is slim, and it would probably take many years before the new technology could be applied at a large scale. Carbon sequestration, which is also unlikely to materialize in the near

future, could help us avoid the worst consequences of climate change, but it would not help the issue of resource exhaustion—it could actually make it worse.

This is not an anticapitalist critique; my concern lies with the consequences that our lifestyle has on the environment and their impact on future generations. I grew up under a Communist dictatorship; owning a typewriter required taking it annually to the police (which was actually called Militia) and typing a preestablished text on a sheet of paper that was then handed over to an officer. Having this printing proof on file would allow the authorities to come after me if one day I decided to type some leaflets against the regime. Any such leaflets were considered dangerous and able to mobilize a populace starving for truthful information; I know the cases of people who spent years in jail for printing or distributing leaflets. Such policies were common in Communist countries; the practice of registering typewriters was introduced in the Soviet Union during Stalin's regime (Treisman, 2011, p. 6). Today, I am able to say what I think and quickly distribute it to thousands of people in print or electronically; however, chances are that most of them may not have the time or energy to read it, or, having read it, to take action.

Questioning consumerism is unpopular and is often dismissed as Marxist or unpatriotic (Leonard, 2010, pp. 147–148). I will bring arguments later to contest such charges—I think this may be useful considering that I will be discussing issues such as globalization, the relentless emphasis on economic growth, new technologies, the media, and celebrity culture, which in my opinion enhance the totalizing tendencies of consumerism and of the capitalist system it now represents. I want to emphasize again that I am not advocating an anticapitalistic argument in this thesis; in my opinion,

capitalism is still flexible enough to be able to accommodate difference—on a small community scale.

Globalization

The following arguments are focused on the negative consequences of globalization examined in the context of this thesis. At the same time I am aware that globalization can have important positive consequences. It can contribute to the introduction of better government practices such as "holding regular multiparty elections, respecting the rule of law and human rights and promoting the twin principles of transparency and accountability" (Akokpari, 2006, p. 126). Corporate cross-border mergers and acquisitions have been found to "have a positive influence on human rights, especially in non-OECD countries" (Kim & Trumbore, 2010, p. 732). Globalization and modern communication media allow environmental and charitable organizations such as 350.org or 1% for the Planet to establish a worldwide presence and promote worthy causes.

However, since globalization leads to important increases in manufacturing and trade, it worsens the crises of climate change and resource exhaustion due to the increased consumption of raw materials and energy. It also contributes to massive relocations of workers and to increases in wealth inequalities. If consumerism teaches us that that everything can be bought and sold, globalization adds to this principle five important words: *for the lowest possible price*. Globalization allows corporations access to a global supply base and therefore gives them the ability to maximize their profits by paying the lowest price for the products and services they use. While providing development opportunities to less developed countries by encouraging

competition and eliminating trade barriers, globalization also establishes a system of values in which the low price criterion trumps everything else. Globalization complements consumerism by reinforcing the idea that the whole world is within our reach, filled with bargain opportunities. However, if we allow the lowest price to become our leading principle, our whole system of values is going to be altered.

Globalization is meant to stimulate employment, but the opposite happens often as a consequence of it, because Western companies are able to find suppliers who compete to do the work for less and less money. It is a "race to the bottom" that ultimately has no winners. A few years ago I worked for a manufacturing company in southern Ontario that made machined metal parts. The owners started years ago with a lathe installed in a garage and progressed slowly to grow their company and become a middle-sized business serving Canadian and U.S. customers. In the early 2000s they experienced increasing price pressures from all their customers, and they soon realized this was due to international competition. They decided to develop a network of reliable Chinese suppliers to manufacture most of their parts; even if they were able to keep their North American plant open, much of it changed from a machine shop to a warehouse, inspection, and distribution operation.

A "job-trained" (semitrained) shop floor inspector can be hired for a third of the wage paid to a skilled machine operator, and the parts made in China cost roughly a quarter of the price one would need to pay a North American supplier. The quality of the Chinese parts is often poor, and the inspectors were typically rejecting around 20% of the parts; sometimes the rejection rate was going as high as 80%, which amounted to tens of tons of scrap each year. In the meantime, several skilled machine operators

lost their jobs and were replaced with low-paid shop floor inspectors; and many tonnes of ore have been mined, refined, made into different grades of steel, formed into bars and profiles, machined, painted, packaged, put into containers, shipped by truck several hundred kilometres to Shanghai, shipped by sea to Vancouver, shipped again by truck to southern Ontario, unpacked, and inspected, only to be thrown in the garbage. The only "useful" activity done with the scrapped parts was to take pictures of them and send them to the Chinese suppliers to substantiate the rejections and the subsequent deductions from their pay; most likely, other workers, Chinese this time, were to lose their jobs over the mistakes.[1]

Does such a mode of operation make any sense? Yes, from a very important point of view—financially it is more profitable to make parts overseas, even if we consider all the waste. It is worth noting that my example stems from the activity of a *small* company, but the extent of similar trade done by larger companies in North America (as well as Europe and other regions) is enormous, hardly imaginable. Based on information obtained from other companies I dealt with, the proportion of items rejected, mentioned above, is typical. The North American or European customers do not care how many parts are made wrong because they will not pay for any of them; and raising the quality level of an overseas supplier is a very long and difficult process.

How long can we afford to be this wasteful? With regard to materials, probably until the end of the century, which could bring, together with climate change and a shortage of fossil fuels, a near exhaustion of mineral resources (Arthus-Bertrand, 2009). With regard to people, it is harder to estimate. China still has a huge development potential, provided it does not run into severe environmental problems.

With the exception of major cities and the coastal regions, the country is still undeveloped or underdeveloped, and the Chinese forecast an average economic growth of 7% between now and midcentury. I can hardly imagine how this could happen, since it implies that the size of the Chinese economy would grow between now and then "by a factor of at least ten" (Stern, 2009, p. 187). Assuming, however, this happens and the Chinese salaries rise, making the country less attractive for Western companies and investors, there are still other countries that will be able to offer even better deals.

Who profits from globalization? In the case of the machining company I used for my example, a very few individuals who got rich—the owners of the company. I think, however, this is the rule, not an exception, because the values promoted by the Western economic system "serve the interests of today's political and economic elites, and so are aggressively defended by these elites" (Homer-Dixon, 2008, p. 305). This is not to say that all companies perpetuate such plunder in the name of enriching a few, but most of them do. A notable exception is the U.S. corporation *Interface*, one of the largest carpet manufacturers of the world, whose CEO, Ray Anderson, aims to make the company 100% sustainable in 20 years. Such initiatives are not only worthy of high praise, they are, most importantly, *possible*; however, the likelihood that other CEOs will start following such examples[2] is slim because the effort is significant and the profits uncertain.

Could the unwanted consequences of the corporate pursuit of profit be avoided? Could corporate power be reined in, and if so, by whom? Could organized labour do that? Hardly so today, when the economic crisis sweeps whole regions of the

globe and redefines the policies of national governments in spite of widespread popular discontent. Some examples are Greece, Ireland, Portugal, and in the future probably other countries (the names of Italy and Spain are mentioned more and more insistently) will have to accept the stringent conditions imposed by the IMF (sharp reductions in salaries, and cuts or price increases in social services) in order to get the loans needed to avoid defaults on their national debts. Also, my personal experience with organized labour has led me to believe that unions are efficient in defending the rights of workers but lack a long-term vision and fail to anticipate the consequences of their actions.

Companies often display a similar narrow-mindedness by making profit the only criterion for business success: "The motive force for business activity is profit. The question arises whether the drive for profits is an end in itself, pursued more or less irrationally, or whether it serves some intelligible purpose" (Schmitt, 1969, p. 329). There are signs that the drive for profits has become an end in itself and is pursued irrationally; when companies pursue profits at the expense of the people that work for them, or the environment, they are defeating their own long-term interests.

It has been said, "a life dominated by a single passion is a narrow life, incompatible with every kind of wisdom" (Russell, 2005, pp. 529–530). It appears there is a deep irrationality in the rigid pursuit of a narrow goal such as profit without considering its long-term consequences; this is an inherent flaw in any organization or structure that lacks the vision and flexibility to adapt and grow meaningfully. Having goals is essential in defining an organization, but rigidity implies the goals end up constraining every other consideration, which will weaken and ultimately destroy the

organization. The global economy and its growth, driven largely by corporations and representing their interests, has become a rigid goal, and the more power it gathers, the more it weakens and threatens other organizations, structures, and individuals, and ultimately the whole society.

Economic Growth

If it is true that civilizations fall as a consequence of the "morbid intensification of their own first principles" (Soros, as cited in Homer-Dixon, 2008, p. 178), then the concept of economic growth should come under close scrutiny. It was argued more than 40 years ago that "a capitalist economy must always be adding new productive capacity if it is to keep its existing capacity in operation" (Dillard, 1969, p. 843); this largely unquestioned principle continues to underlie the economic policy of the Western world today.

Climate change as well as the current economic crisis are generating very diverse reactions. With regard to climate change, these reactions range from climate change deniers who say this is a fake crisis set up by leftists who plan a socialist takeover of the world economy—to some very concerned experts who say the point of no return has already passed. With regard to the state of the world economy, at one end of the spectrum we find the economic optimists who assure us that free markets and modern science will ensure endless growth and prosperity, and at the other end we find those who warn us that the crisis is far from over. For a nonspecialist it is bewildering to examine and pass judgment on such a wide range of opinions. According to Homer-Dixon:

> Today's overwhelming volume and variety of information makes it possible – by selecting and connecting data points carefully – to paint practically any picture of the world and *make it seem accurate* [italics added]. So the pictures we paint are often more a reflection of our deepest personal orientation, especially of our basic optimism or pessimism, than of empirical evidence. (2001, p. 33)

How could we then make an informed judgment on an important concept such as economic growth? Maybe analyzing some of the benefits of economic growth, as well as some of its dangers, could help.

In a very succinct formulation, economic growth "maintains our quality of life (as currently defined), absorbs workers who have lost their jobs because of technological change, and ultimately, ensures the political stability of our societies" (Homer-Dixon, 2008, pp. 267–268). These benefits are highly important, and therefore economic growth needs to be a part of our policies for the immediate future. However, the dangers posed by economic growth are equally important. It has been mentioned that at present time we consume 150% of the resources the earth has to offer (Leonard, 2010, pp. 152–153); the end of some very important resources is already in sight, and we will not be able to replace them. This makes economic growth incompatible with the long-term interests of humankind.

Can we conceivably replace fish? A large international study has found that if we maintain the current fishing rates, "all the fish, shellfish, invertebrates, everything that people consume that comes from the ocean, all of it, globally" will disappear by 2048 (Worm, as cited in Hartmann, 2009, p. 25). This will dramatically alter the

functioning of marine ecosystems and will have adverse consequences on human health as well.

Can we conceivably replace soil? It takes a very long time for soil to be formed, starting with the "inorganic grindings of rock generated over millions of years of weathering and chemical actions by the elements" (Homer-Dixon, 2001, p. 90); soil is also extremely complex: "A single gram of soil may contain between a million and a billion bacteria; a square meter of grassland soil can harbour two hundred thousand arthropods . . . and close to a thousand earthworms" (Homer-Dixon, p. 91). Yet, due to farming, one percent of topsoil is lost every year, which means we could lose all soil within a century. "Globally, we're losing soil at a rate twenty times faster that it is formed" (Montgomery, as cited in Specter, 2009, p. 113).

These two examples can be complemented by many others, showing dramatic changes in the functioning of the earth system: The use of water, the damming of rivers, the frequency of great floods, the loss of terrestrial and ocean ecosystems, and the loss of biodiversity show exponential tendencies (Steffen, 2006, p. 154). The same exponential tendencies are shown by indicators of human activity, such as growths in population, total real GDP, foreign direct investment, as well as growths in the international tourism, the consumption of paper and fertilizer, and the number of motor vehicles and telephones manufactured; it has been argued convincingly that the changes in the earth system have been generated by human activity (Steffen, pp. 154–155).

Three "planetary boundaries" have already been crossed—the rate of species extinction, human-induced climate change, and the global nitrogen cycle, and several

others are quickly approaching their limits, including "the boundaries for freshwater use, for converting forests and other natural ecosystems to cropland, for acidification of the oceans and for the phosphorous cycle" (Munro, 2009, p. A7). Economic growth is an important contributor to overstepping these planetary boundaries, which could lead to sudden environmental changes "with deleterious or even disastrous consequences for human society" (Rockstrom, as cited in Munro, p. A7). This is a significant danger, because ecological systems "have many possible states . . . as ecologists say, *multiple equilibria*" (Homer-Dixon, 2001, p. 130); and a system can flip abruptly from one state to another, following a small outside perturbation (Homer-Dixon, p. 125). The interaction between humanity and nature has reached planetary dimensions, and we cannot predict where it will take us (Homer-Dixon, p. 133).

According to the trends outlined above, many important resources of the planet will be imperilled or exhausted during this century at the current consumption levels, even if we have zero economic growth from now on. However, for the sake of argument I will briefly examine the relationship between several percentages of yearly economic growth and the time it takes for the world economy *to double* as a consequence of that growth. This is not a long-term perspective as one may be tempted to think. An average yearly growth of 2% would imply the doubling of the world economy in 35 years; most economists would probably consider such growth as insufficient, since the American economy "must expand 3 to 5 percent annually . . . just to keep unemployment from rising" (Homer-Dixon, 2008, p. 196). An average yearly growth of 3% would imply the doubling of the world economy in 24 years; the relationship between the average yearly growth and the time needed for a doubling of

the economy continues as follows: 4% = 18 years; 5% = 14 years; 6% = 12 years; 7% = 10 years.[3]

The concept of the "invisible hand," based on a misleading interpretation of Adam Smith (Patel, 2009, pp. 61–62), gives the markets a quasi-divine character; assuming that markets are inherently self-regulating means economic growth can continue forever. It is however more likely that markets are inherently unstable:

> When interest rates are too low for too long, especially if inflation appears to be under control, people and companies tend to borrow recklessly to invest in factories, technology, and other productive capital . . . and to speculate on assets like real estate, stocks, and bonds. . . . Such investments and asset bubbles always pop, usually when interest rates suddenly rise . . . and individual and corporate borrowers can't maintain payments on their huge debts. The potential result: an economic crash that leads to a severe credit crunch as investors and speculators withdraw from the marketplace. (Homer-Dixon, 2008, p. 200)

This "potential result" has been witnessed many times over, from the South Sea Bubble of 1720 to the financial meltdown of 2008.[4] It appears that economic growth is by no means self-regulating and could be instead an important internal flaw of capitalism (Patel, 2009, p. 6). This should have led us to look for alternatives to growth, even if we could disregard the environmental limits discussed above (which we obviously cannot).

Not only do we choose to rely entirely on economic tools—like economic growth and the market system—that periodically give us very nasty surprises, but we

do that stubbornly. Albert Einstein has defined insanity as "doing the same thing over and over again and expecting different results"; this is what the Western world is doing when dealing with the economic, social, and environmental crisis that has already started to unravel: It continues to focus on economic growth.[5]

Such systemic inability to change has occurred before: The Roman rulers thought their empire (very remarkable in many respects) was invincible and eternal. However, after weathering many crises, it came to an end in the fifth century (Homer-Dixon, 2008, pp. 247–250). The fall of the Roman Empire has been analyzed by many authors; there is no consensus on what caused this fall, but economic growth was most likely a contributing factor, because it required structuring "an increasing area and a growing number of people into a coherent whole" (van der Leeuw & de Vries, as cited in Homer-Dixon, p. 241). This process became harder and harder due to its increasing complexity and in the long run was unsustainable.

The example of the Roman Empire is not unique: In the past, civilizations grew, and after a while they collapsed; modern ones have done so more abruptly (Homer-Dixon, 2008, p. 126). The fact that our civilization is still growing (or appears that way, because this growth is now largely artificial and overextended) should not mislead us into believing that we can continue forever on our current path. We cannot, due to many factors linked to our current economic model: overpopulation and pollution; increasing wealth inequalities, which threaten the stability of our societies (Domhoff, 2010); health consequences such as eating disorders and clinical depression (Homer-Dixon, 2008, pp. 197–198); societal consequences such as violence, teenage births and educational failure (Wilkinson & Pickett, 2010, p. 11); increased likelihood

of military conflicts (Paskal, 2010); and most seriously, due to the future effects of climate change and the exhaustion of resources.

It is impossible to eliminate economic growth in the immediate future because the functioning of our markets, and of the whole capitalist system, is articulated around this concept. The consequences of abandoning economic growth will be far-reaching, and, after the process is set in motion, they would be hardly controllable. One can anticipate the consequences of such a change would be at least as important and extensive as those engendered in Europe by the fall of Communism. Mikhail Gorbachev, the main initiator of those changes, said, "when we started, we did not understand the depth of the problems we faced" (as cited in Judt, 2005, p. 637). Abandoning the concept of economic growth will likely create even more serious problems; however, "voluntarily or not, growth as currently defined *is going to stop this century* [italics added], and we'll all be a lot better off if the process is voluntary" (Homer-Dixon & Garrison, 2009, p. 214). Economic models that ensure long-term stability *without* economic growth have been proposed (T. Jackson, 2009, Victor, 2008), but they are currently ignored.

The challenge is enormous, but if we are not facing it, we risk losing everything we have achieved as a civilization and rendering the planet largely uninhabitable.

New Technologies

The 19th century brought the introduction of mechanized industrial production which "profoundly altered the social structure, and gave men a new conception of their powers in relation to the physical environment" (Russell, 2005, p. 652). The increased

productivity allowed humans to produce the goods needed for their subsistence in less time, creating the possibility to cut down on uninteresting work and use the additional leisure time for meaningful activities (Russell, 1932). This idea has not been tried yet, even if the end of the 20th century brought changes just as impressive as the introduction of mechanized industrial production in the agricultural society of the 19th century—I am referring to the development of computer technology and software, modern communication equipment, and the Internet. The impact of these changes on many industries has been enormous, often leading to drastic reductions in labour requirements, and as a consequence companies have been able to greatly increase their profits.

The design and prototyping of an internal combustion engine can be used as a relevant example to illustrate how these technological changes have affected the manufacturing industry. In the 1980s, it would have taken several engineers more than a month to design the engine; a few draftspersons would also have been needed to generate the drawings. These drawings would be copied and forwarded to the purchasing department, where other people would calculate what quantities were needed for each item, then would mail the drawings and purchase orders to suppliers. Sometimes the engineers were required to travel to suppliers and clarify issues that were too complex to be dealt with over the phone.

Two to three months were typically needed after completing the design in order to have a prototype ready for testing. Based on the results of the testing and the extent of the modifications required, a few more months could have elapsed before obtaining a fully functional product, ready for mass production. Mechanical problems would

often be detected during the prototype trials, and the components that did not withstand the loads would fail and be redesigned together with their mating parts. It would not be uncommon to have delays of one year or more in launching a complex product, and tens of people would need to be on payroll during all that time.

Today, one engineer can complete the design work in a couple of weeks using three-dimensional design software. This software allows the engineer to generate the complex spatial shapes that make up the individual components of the engine and then virtually assemble them together. The engine can even be made to "function" in the sense that the pistons will move back and forth on the screen, the crankshaft will turn, the valves will open and close, and so on. The software allows for the detection of mechanical gaps or interferences at the design stage, and modifying one component usually drives the corresponding modifications of its mating parts automatically.

The tridimensional shapes that represent each individual component are called models, and the software can test these models and determine if they can withstand the loads they will be subject to in operation. Unless a mistake is made, they are guaranteed not to fail. Once the models are finished, the software generates the drawings automatically; a database feature allows for the calculation of the quantities needed for each item, and the suppliers receive all the information electronically. That information is then fed to postprocessing software that generates the numerical information used by the automated manufacturing machines.

It is probably accurate to estimate a hundredfold labour reduction between the design and prototyping processes used 25 years ago and the ones that exist today. The labour force used in the 1980s required medium to high qualifications—engineers,

draftspersons, office personnel. The same work can now be done with a few computers and one engineer with good knowledge in tridimensional design software and related applications. Moreover, if the manufacturing facility is, for example, located in China, the company can further increase its profits by taking advantage of the low wages paid in that country.

Design and prototype work are not the only examples of activities that can lead to the elimination or outsourcing of qualified jobs. If China is an unbeatable competitor for our manufacturing industries, so is India for the high-tech domain. Many software companies have their technical support departments operating from India for a fraction of the costs they would need to pay to run the same operations in North America.

People in high-tech professions can feel good about doing qualified work, "riding the wave" of technology, so to say. In many other cases, however, this is not true. If we take the example of online ordering companies (which sometimes offer the only way of getting, say, a book that you need in a hurry), at one end you have a consumer who needs to open a browser window and enter a username and a password; at the other end, a printer in a warehouse generates a work order showing on what shelf the book is to be found and the quickest way to get there; another printer generates a label that is affixed on the shipping box, and in a day or two the book comes to your door. Quite impressive, but in this case people are only auxiliary to technology.

Sometimes people are replaced by technology altogether. Science fiction stories published many years ago were depicting scary scenarios in which robots were

rebelling against humankind; that has not occurred, but technology has taken over the jobs of many, partially or sometimes completely, in the name of convenience and efficiency (and profits, of course). Take the example of airline ticketing. The consumer will again open a browser window, and a few mouse clicks later will obtain information regarding the prices, airlines, and the different flights offered; after a choice is made and payment is received, the software issues a confirmation code. At the airport, entering the same confirmation code at a data terminal will generate the ticket. The process is easy, convenient, and completely automated—allowing the airline company to save the salaries of those who used to work for it and who are not needed any more. Real estate agents may soon follow—people are now able to take virtual tours of the properties they are interested in and often use an agent only to finalize the deal. The recent changes regarding commissions in this industry reflect this trend.

This is not to say that the new technologies have only bad aspects—they often improve the quality of our lives (one example out of many being their applications in medicine). They allow us to obtain information and to communicate more easily than ever before; at the first sight this is tempting, because people could think they will have more time and more freedom to decide what to do with it. However, many of them will spend that time working even more:

> Thus the technologies that save us time and labour individually – that empower each of us – bind us collectively into a frenetic, mad race in which we often feel more caged by obligations and demands than before. The tools of our liberation often seem to imprison us. (Homer-Dixon, 2001, p. 102).

Although we could have *more* free time due to the new technologies, we end up having *less*. If a company provides a paid cell phone, the user probably needs to answer it after the working hours as well; time spent in an airport or in flight can be used to work on spreadsheets or to answer emails—under a mounting pressure, because as technologies become more and more efficient, they tend to make very easy, or automate completely, jobs that once required significant skills and training. Consequently, the well-paying jobs become fewer and the competition for them fiercer. Some are of the opinion that it is now easier to start a business than to obtain a well-paying job.

If 80 years ago the use of machines could have allowed everyone to live a more enjoyable life by working less, this should be so much truer today. However, making such a vision reality is not something that will be brought by technology. If this ever happens, it will be a consequence of extensive social change and will most likely involve challenging some of the core assumptions of our society. As we will see further, this would be essential for its survival. Unfortunately the technologies that make us "free" can help very little in this process; and, paradoxically, they can enhance our growing isolation from our neighbours and communities.

Internet and New Communication Media

Modern technology is a convenient channel for advertising. Take the example of Facebook, a very popular website that provides the convenience of keeping in touch with friends and family, sending messages and pictures from mobile devices, and so on. Facebook also offers targeted advertising according to the interests of the prospective buyers; unlike the "classical" pop-up advertising windows which are most

of the time blocked by the browsers, Facebook displays on the right-hand side of the screen a column of thumbnail images with only a few words below each one of them. What makes these images special is the fact that if they show up on your screen you are likely to be interested in them—much more likely than in an average pop-up ad, because they are designed to suit *your* interests. Facebook asks for information when you open a *free* account with them. It is not mandatory to provide it, but if you want to be found by your old elementary school pals or by "people with similar interests" from across the world, the more you fill in, the better.

If someone wants to sell you something, this information is very valuable. I can design for example an ad to promote a product targeted to females 23 to 27 years old, who have graduated high school in Ontario, work in accounting, love traveling, exercise twice a week, and are interested in martial arts. Only the people who have provided information that matches my criteria will have my ad showing on their screens. Once I define the criteria, the software will return a "bid range" which offers me the possibility to choose how much money I want to pay each time someone sees my ad or clicks on it. The higher the price I choose from the bid range, the higher up my ad will appear in the column of thumbnail images, so its exposure will increase. I can also choose the amount I want to spend per day, how much money in total, and so on.

Texting or using mobile phone applications is commonplace today—but a mere 15 years ago these technologies did not exist. At that time, the Internet was just gearing up to support the handling of large amounts of data and was not yet the indispensable tool that it has become since; I remember how amazing it was to be able

to exchange a message by email with someone overseas in just a few minutes, while it used to take 3 weeks using the "snail mail"!

This ease of communication has both positive and negative aspects. The positive aspects are related to being able to share information and exchange ideas very quickly with a large number of people. In 2010, young people in Iran were able to better co-ordinate their actions during a popular uprising by using applications such as Twitter, and this most likely contributed to saving lives. This is an example of a social use of this technology; Internet articles that allow the readers to reply or make comments are another example—taking time to read the comments and respond to some of them contributes to public discussions that may be useful. This can also allow one to gauge how the public feels about certain issues of interest.

I have read many stories and comments, and replied sometimes, in the case of articles related to the economic crisis and to climate change. The public seems to be quite informed with regard to the causes of the economic crisis—the blame is placed on corporate greed and lack of regulation, which has hurt many while favouring a few. In the United States, even before the crisis, in 2007, "the top 1% of households (the upper class) owned 34.6% of all privately held wealth . . . leaving only 15% of the wealth for the bottom 80% (wage and salary workers)" (Domhoff, 2010, p. 1). During this crisis, the "average Americans have been hit much harder than wealthy Americans," with the result that "as of April 2010 . . . the wealth distribution is even more unequal than it was in 2007" (Domhoff, p. 1). As a consequence, many people believe that governments and corporations look after their own interests and are not providing any help for the average citizens. The comments are often bitter and

pessimistic, and after reading them one gets a certain feeling of hopelessness that things are going to get any better. Nevertheless, they reflect a significant concern with the economy and good levels of information and understanding, probably as consequence of the large numbers of people who are suffering the effects of the economic crisis.

Such awareness is not typical when it comes to climate change. According to Stern (2009): "It is remarkable how many economists, lawyers, journalists and politicians set themselves up as experts on the science" (p. 32). Their opinions can lead to misunderstandings of scientific facts and can mislead the public into believing the issue of climate change is either false or exaggerated. Unfortunately, this narrative is widely promoted; things can be made to appear what they are not, with the purpose of discrediting scientific evidence and cultivating ambivalence with regard to climate change.

At the end of September 2010, I attended a conference about climate change and the exhaustion of natural resources, which was held in Ottawa by David Suzuki. The main theme of the conference was that humans, as a species, live unsustainably. We are generating large quantities of greenhouse gases that alter the climate of the planet while at the same time consuming resources much faster than they can be regenerated. As an illustration, Suzuki used the example of bacteria on a Petri dish that multiply exponentially until there is no food left, after which they die.

Two days later, a full-page article about the conference appeared in *The Ottawa Citizen*. In the subtitle, the author was asking the following question: "If, as David Suzuki claims, we are only beginning to understand the complexity of nature, how is

he so sure catastrophe is imminent?" (Gardner, 2010, p. A11). The article argued that nobody can accurately predict the future and that environmentalists often contradict themselves:

> This stunning contradiction shows up most clearly when environmentalists talk about climate change. On the one hand, greens oppose geo-engineering schemes – deliberate attempts to alter the atmosphere to counteract the effects of climate change – on the grounds that we cannot possibly predict the consequences of our actions. But they also treat forecasts of what will happen if humanity doesn't curtail carbon dioxide emissions as perfectly reliable glimpses of our future. That makes no sense. Either we can reliably predict the effect human actions have on climate and the natural world or we cannot. Which is it? (Gardner, p. A11)

The above paragraph is a typical example of the distorted arguments that often lead to misunderstandings of scientific facts and to uncertainty about climate change. A couple of reasoning fallacies can be quickly identified in it. The first one is an either/or fallacy (M. N. Browne & Keeley, 2004, p. 92) about being or not being able to predict the effect of human actions on the planet. The second one is a straw man fallacy: "distorting our opponent's point of view so that it is easy to attack, thus we attack a point of view that does not truly exist" (Browne & Keeley, p. 91). In our case, Suzuki's main point was about living unsustainably, and not about predicting the future. The generic use of the words "greens" and "environmentalists" is also misleading: Which environmentalists are we talking about? Do they all have identical points of view? Who said what and when?

The list of false arguments does not end here. On the one hand, the wording of the article may give the impression that geo-engineering schemes are readily available and could be applied without risks if only the greens would cease their opposition. This is not the case: Geo-engineering schemes have never been tried and are controversial, for technical as well as political reasons (Hamilton, 2010, pp. 182–183). They are a measure of last resort and could buy us some time, but they are not in any way a long-term solution to the problem of climate change.

On the other hand, "what will happen if humanity doesn't curtail carbon dioxide emissions" is proven by the atmospheric samples extracted from the Antarctic ice cores, going back for the past 425,000 years. There is a very strong correlation between the past average temperatures of the planet, the levels of carbon dioxide in the atmosphere, and the sea levels (see Figure 2). It should also be noted that throughout the whole period the levels of carbon dioxide have oscillated only between 180 and 300 ppm. At the time of writing, the level of carbon dioxide is at 393 ppm and rising by 2 ppm yearly. This increase is due to the human perturbation (Steffen, 2006, p. 155).

The lack of space does not allow me to fully refute this article, which unfortunately is one out of many that get published daily, in print or electronically. I wrote a letter to the editor (Sarbu, 2010) arguing that the main point of the conference was about living unsustainably and not about predicting the future. The reply was published, but one cannot compare the impact of a full-page article to that of a 140-word reply. I made the above argument about the conference and the article that followed because this type of disinformation is very frequent and is one of the main

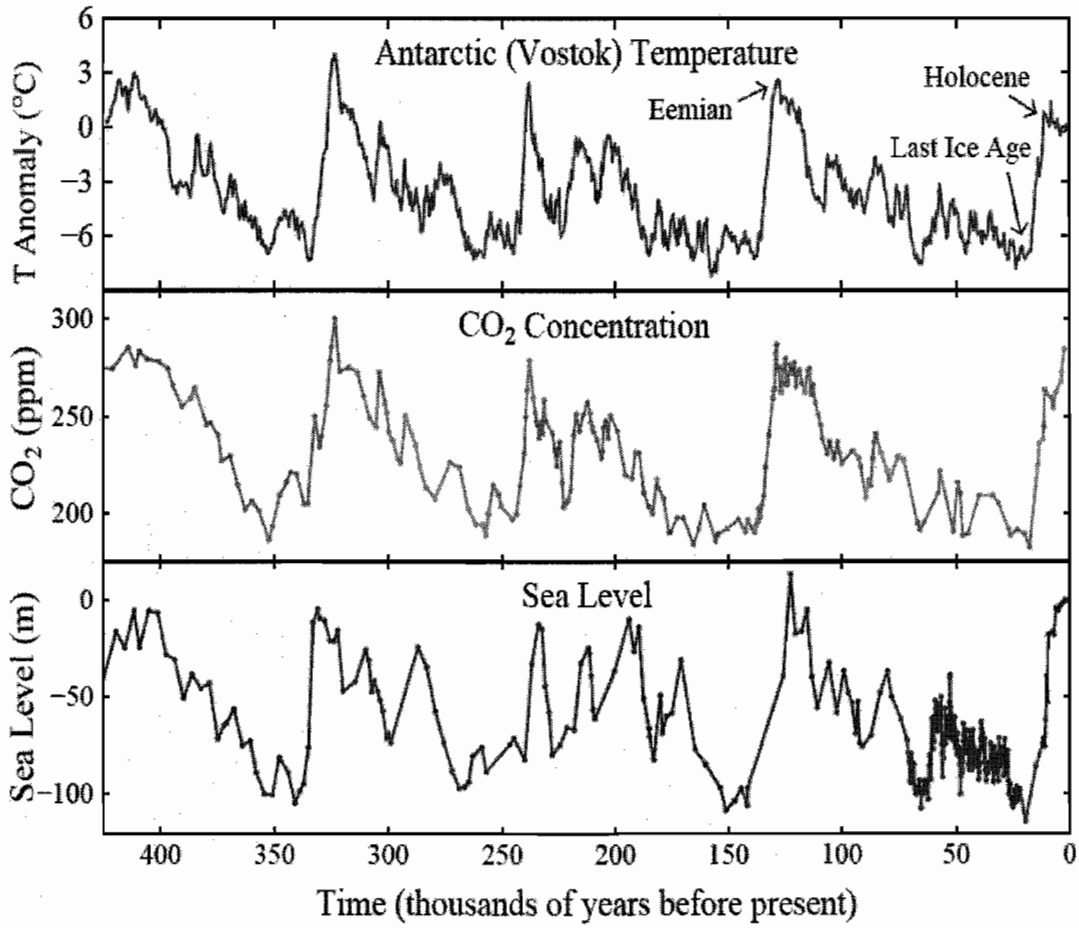

Figure 1. Correlation between temperature, CO_2 concentration, and the sea level.

Note. From *Storms of My Grandchildren* (p. 37), by J. Hansen, 2009, New York: Bloomsbury USA. Copyright 2009 by James Hansen. Reprinted with permission.

reasons people feel ambivalent about climate change and hesitate to take action (Scannell & Grouzet, 2010).[6]

The examples given above about electronic media illustrate that sometimes modern technologies can contribute to social engagement. However, more often than not, they contribute to social disengagement. The facility with which we can communicate with friends and family is enticing but it also contributes to carving private spaces in what should be common ones. We interact less and less with the people who are physically beside us, and we switch instead to virtual networks of friends, coworkers, and acquaintances. Our world becomes more accessible, but at the same time its communities suffer; it is a world that suits our tastes, but for this reason it gradually becomes self-referential. At an individual level, we live in our own bubbles, isolated from our communities, and as inhabitants of the Western world, we take for granted the benefits of our civilization and often ignore the suffering of people living in other parts of the globe. We may also be led into believing that technology can help us deal successfully with any crisis.

Virtual Worlds and Celebrities

While this is not true, technology can now offer us one more way to evade the world if we are not happy within it and build other worlds where we can fulfill any desire. One example out of many is *Second Life*, a virtual world where users log in under an assumed tridimensional appearance called avatar and are able to do whatever they imagine:

> From your point of view, *SL* works as if you were a god in real life. Not an almighty god, perhaps – more like one of those mythological minor gods, who

> tended to specialize in certain areas, get drunk, have sex, fight, and (most important) cast spells left, right, and center. . . . And just like a mythological god, you're able to fly, and teleport wherever you like in an instant.
>
> You can also change your appearance whenever you want to, and to whatever you like. In case you've ever dreamed of pulling a Zeus number and wooing someone as a swan, *Second Life* offers you the opportunity. (Rymaszewski et al., 2007, pp. 7–8)

The "mythological minor gods" mentioned above are similar to the gods of the Greek pantheon. Most of them are not any kinder or wiser than us – just more powerful; and now, for a small amount of money, any mortal can behave like them, at least in imagination. *Second Life* has its own internal currency, the Linden dollar (L$), which can be exchanged against U.S. dollars or other recognized currencies and is used to purchase products and services in this virtual world. Some of us—celebrities—can behave in real life like the ancient Greek gods. They often get drunk (or high on drugs), have sex, fight, and cast a spell on many of us who feel compelled to follow their adventures. In doing so, precious energies that could be put to a better use end up feeding the consumerist lifestyle:

> Celebrities are skilfully used by their handlers and the media to compensate for the increasingly degraded and regimented existences that most of us endure in a commodity culture. Celebrities tell us we can have our revenge. We can triumph. We can, one day, get back at the world that has belittled and abused us. It happens in the ring. It happens on television. It happens in the movies. It

> happens in the narrative of the Christian Right. It happens in pornography. . . . But it almost never happens in reality. (Hedges, 2009, p. 37)[7]

Celebrities also contribute to maintaining a vague but powerful feeling that, in spite of the widespread suffering and the economic and social misery that has engulfed many people and communities, one can still make it "from rags to riches." One can even feel good (and rightfully so) in comparison with some celebrities and can therefore be tempted to think: "If they were able to make it, so should I."

Brief Historical Review

In the following I attempt to explain the association commonly made between capitalism and democratic and progressive forces as well as the positive role that capitalism played, in comparison with communism, during the Cold War. I also mentioned my intention to show that any charges claiming the arguments presented above or those that will follow in Chapter Four stem from a "leftist" orientation are not substantiated. From a personal point of view, I spent my childhood and youth under a Marxist dictatorship, and my extended family has had its share of people that were imprisoned or killed by the Communists. I was able to leave my country of birth after the fall of the communism in Europe, and I am grateful for the opportunities offered by Canada, my country of adoption. However, I gradually came to believe that the opposite of capitalism is not socialism or communism as they were experienced behind the Iron Curtain. Those who make this claim today attempt to discourage social change by resuscitating old fears; one of their main arguments is that if we fail to aggressively promote individual liberties, the capitalist system will fall, and socialism (or even communism) will take over.

This argument is misleading on more than one account. First, the liberties advocated represent the conceptions of traditional liberalism, which define individuals as "ready-made" and "entitled to whatever rights they possess independent of any relation they might have with any social or political organization" (Hildebrand, 2008, p. 106). Traditional liberalism argues that the "the primary right of individuals is to pursue private interests, unmolested by state interference," which leads to "a natural opposition between individuals and organized society" (Hildebrand, p. 106). Outdated as they are, such conceptions have not lost much steam and have been used in many recent debates.

Second, from a practical point of view, the current power of corporations and the weakness of organized labour are not substantiating such a claim today. Further, while at the end of World War II communism triumphed over fascism, these two systems were not genuine opposites of one another. While they held sharply different views with regard to private property, they also had many commonalities. Both of them might have been crude attempts at conceptualizing and organizing the social and economic life after the rise of industrialization and the decline of traditional institutions in the 19th century. Indeed, an important intellectual development brought by the 19th century was the

> profound revolt, both philosophical and political, against traditional systems in thought, in politics, and in economics. . . . This revolt had two very different forms, one romantic, the other rationalistic. (I am using these words in a liberal sense.) The romantic revolt passes from Byron, Schopenhauer, and Nietzsche to Mussolini and Hitler; the rationalistic revolt begins with the French

> philosophers of the Revolution, passes on, somewhat softened, to the philosophical radicals in England, then acquires a deeper form in Marx and issues in Soviet Russia. (Russell, 2005, p. 652)

Both fascism and communism have attempted to completely change the social order that existed at the beginning of the 20th century. While communism eliminated private property, the very basis of the capitalist system, fascism advocated "a rejection, a complete and uncompromising denial of the principles of liberalism and democracy, as elaborated and realized in the British, American and French revolutions of the 17th and 18th centuries" (Kohn, 1969, p. 105).

Communist history books have mythologized the figure of Vladimir Lenin and portrayed him as a visionary and a liberator of the oppressed masses of workers. These claims are very far from the historical truth, and their main purpose was to legitimate Lenin's regime as well as the communist dictatorships that were forcefully imposed in Europe after the end of World War II. Lenin had overthrown the tsarist regime only to replace it with an even more cruel dictatorship; it was called the "proletarian dictatorship," but it was the dictatorship of the Communist elites who assumed the leadership of the working classes but used it to advance their own purposes. Lenin himself conceived the communist system as a dictatorship: "No regime, one might say, no aspect of social life seemed to Lenin worthy of his attention unless he could discern dictatorship in it. In praise and encouragement of terror he was second to none" (Dobrin, 1969, p. 942).

While living in a communist country, I experienced the deep chasm between the official propaganda that was trumpeting every day the "victory of the socialism"

and the life of the masses marked by economic deprivation and state oppression. With few exceptions, there was no private property other than furniture and personal belongings; some people could claim a family car as their most expensive and prized possession. Most people lived in condominiums owned by the state, which was collecting all the rents, while state-owned companies were providing the utilities. Communism pretended it could plan ahead the economic growth of the country—through a science that was called, interestingly enough, "political economics." There was to be no more unemployment, and work was decreed for everyone "a right and an obligation"; since the state owned all the companies, it had the means to ensure every citizen was present at work.

Communists were very proud of their achievements: Education was free and so was health care; everyone was to have a few weeks of paid vacation every year and a dignified pension. However, communism as I experienced it was inheriting all the defects of a system based on economic growth and was adding a few of its own. The real economic development of the country had its ups and downs, but these were not acknowledged by the Communist Party. Something that today would be called a recession simply meant people would go to work but would not have anything important to do. I remember that in 1989 I was once assigned the "urgent" task of reviewing and archiving engineering drawings dating from the 1950s which had long ceased to have any practical use.

The state owned all the stores and fixed all the retail prices, so higher prices could not exist—but if the prices had a tendency to go up the products would disappear off the store shelves and reappear on the black market. Health care was indeed free,

but the doctors and nurses were paid so poorly that, with the exceptions of a few very dedicated professionals, bribes were a must if one wanted to be treated well. Personal liberties and the liberty of expression did not exist. I mentioned already how typewriters needed to be registered with the state authorities; the spoken word was also subject to surveillance—one would always need to be careful not to say anything "unorthodox" in public or risk being arrested on the spot by a plainclothes secret police agent.

It should be clear from the above that, in spite of the serious flaws of the capitalist system, I *do not* see communism as a valid alternative of social and economic organization. My arguments are not coming from a "leftist" perspective: communism, as it was experienced behind the Iron Curtain, was a mafia-type system where a small elite used terror to control large populations in the name of the proletarian class.

At the end of World War I, while Russia was ravaged by the communist revolution and the civil war that followed, in Italy and Germany fascist parties came to power. Mussolini and Hitler were backed by industrial elites, and both of them were characterized by shrewd political opportunism and a total lack of doctrine. Mussolini is quoted as saying: "Our program is simple: we wish to govern Italy. They ask us for programs, but there are already too many. It is not programs that are wanting for the salvation of Italy, but men and will power" (as cited in Kohn, 1969, p. 104). Hitler as well as Mussolini established ruthless dictatorships, and their aggressive policies took the world into World War II.

The war was preceded by Hitler's occupation of a few democratic European countries, and it was declared following the invasion of Poland in September 1939. Poland, however, was not attacked by Hitler *alone*; while Nazi Germany invaded the country from the west, the Soviet Union invaded it from the east. Hitler *and* Stalin divided Poland according to their previous understanding (the Ribbentrop–Molotov pact) signed in August 1939. The two totalitarian monsters collaborated closely until 1941, and, save for the heroic resistance of the British people and the involvement of the United States, the outcome of the war could have been very different (Roosevelt, 1940).

The fact that the Soviet Union ended the war as one of the victorious powers has changed the perception of the public regarding the actions of Stalin's regime in the early stages of the conflict. Behind the Iron Curtain, any comment about these facts would be punished by many years of imprisonment. In Western Europe, while Hitler's crimes were widely recognized, Stalin's crimes were kept under silence; this has started to change only in recent years (Judt, 2005, p. 696). In retrospect, one can see World War II not as a confrontation between communism and fascism but between democracy (the Allies) and totalitarianism (Stalin and Hitler); the war can also be seen as a failed elitist attempt to change the world order.

In the years of the Cold War that followed, this confrontation continued between the Western democracies supported by the economic engine of capitalism on one side and the socialist and communist countries with their utopian concept of planned economy on the other. Luckily, NATO and the Warsaw Pact have never entered into war directly, although the civil population lived for decades in fear of a

nuclear conflict (Friedman, 2006, pp. 360–361); the two military blocks however took sides in many conflicts around the world, some of which endure today (Afghanistan, Korea). Finally, the capitalist system (which has played a *positive* role in this context) has proven its economic superiority over the socialist one, and in the late 1980s–early 1990s the socialist/communist system was dismantled worldwide, fortunately without much bloodshed.

Pretending a communist threat still exists today is nonsense—even in the old Warsaw Pact countries the switch to capitalism is irreversible. One of the two surviving outposts of communism, Cuba, has already started to implement market economy measures. North Korea is the only communist country where power has been kept within the same family for three generations; the economic situation is very precarious, and the population is kept under control only through ruthless terror. China, although it remains theoretically a communist country, has acknowledged the superiority of capitalist economic principles and started to implement them about 20 years ago.

After winning their epic fight against totalitarianism, the Western countries and the capitalist system that has gained worldwide acceptance are now faced with new and monumental challenges. The seeds of totalitarianism are far from dead, and the monopoly held by Western countries on defending democratic values has ended—the wars that are being fought today have different protagonists and different motivations.

Conclusion

The capitalist system has become practically the only economic and social paradigm known to the world today. This outcome is due only in part to the positive

aspects of capitalism and is mainly the result of historical developments that started in the 17th century and ended in the late 1990s. The fact that capitalism has been associated in the 17th and 18th centuries with democratic and progressive values, as well as the positive role it played during the Cold War have placed capitalism in a position of superiority from an economic as well as a social perspective. However, this superiority has become very questionable: In spite of its triumph, the capitalist system is now undermined by its narrow focus on economic growth and profit, which, combined with the tremendous power of modern science and technology, has led the world into the current economic crisis, which shows no signs of relenting and is hurting large numbers of people.

The economic interests of the corporate and political elites of the leading capitalist countries are intrinsically linked to industries that are highly dependent on fossil fuels; as a consequence, the capitalist system is now the main driving force behind climate change and the exhaustion of natural resources. For this reason, capitalism must renew itself by adopting new values, or perish—together with the economic and social structures that support it worldwide and are supported by it. A war against nature and the laws of physics—the ultimate form of hubris—can end only in disaster.

CHAPTER THREE: THE HUMAN CIVILIZATION AT THE CROSSROADS

An ancient Greek myth narrates the story of a violent and fitful man, named Erysichthon, who, one day, together with some companions, proceeded to cut down a rich, old grove belonging to the goddess Demeter. During this act of premeditated violence, "a particular poplar-tree is struck" and its nymph cries out to the goddess. First, Demeter warns Erysichthon and his friends: "Although greatly angered . . . she approaches the offenders to issue a preliminary warning in the guise of her own priestess, Nikippe, carrying the clear equipment of her office" (Bulloch, 1977, pp. 99–102). While his companions flee, Erysichthon dismisses the warning brutally and contemptuously. Then, Demeter assumes her godlike form and afflicts Erysichthon with insatiable hunger and thirst. After that, he needed to eat and drink so much that he spent all his riches on food. As a consequence, "Erysichthon ends up, king's son though he is, as a beggar at the cross-roads living off other people's refuse" (Bulloch, p. 108). Finally, his hunger and thirst drive him insane—he starts eating parts of his own body and dies a painful death.

The ancient Greeks believed that certain crimes—especially the killing of relatives—deserved exemplary punishment. In some of their myths, the perpetrators of such crimes are haunted by the Erinyes, terrifying deities of vengeance, depicted as "gorgonlike women wearing long black robes, with snaky locks, bloodshot eyes and clawlike nails" (Haley, 1969a, p. 681). They are not only frightful but also unforgiving: "Though just, they are merciless and take no account of mitigating circumstances" (Haley, p. 681). These myths have proven to be enduring due to their

artistic merit, but also as cautionary tales, warning people to be prudent and not to think they can do anything they want with impunity.

Although some of the effects of global warming are already visible, climate change and its consequences on nature are still being debated. The opinions range from a total denial of any climate change problem[8] to the hypothesis that climate change is already happening, it is unstoppable, and all that humanity can still do is to organize an orderly retreat.[9] I will not review the whole array of opinions, because the overwhelming scientific opinion is that climate change poses a real threat and has the potential to severely disrupt the life of humans and many other living beings.

The following brief analysis of the effects of human activity on nature is roughly divided into three topics: the current status of the natural systems of the earth; indicators of impending climate change; and possible consequences of climate change. This division is made only with the intention of facilitating the conceptual analysis of each topic; however, these topics are interrelated, and treating them separately does not imply denying the relationships among them.

The Current Status of the Earth's Natural Systems

The exploitation of nature as an economic resource is considered by many an unquestionable privilege of humankind. However, there is increased evidence that human overconsumption threatens both nonrenewable resources (such as fossil fuels and minerals) and renewable resources (such as fresh water, forests, and fisheries). In the following pages I will present briefly a few relevant aspects of the current status of the ecosystems and how they are being affected by human activity.

Living beings depend on their environment to provide them with nutrients and stable conditions of life. This stability is ensured through a dynamic equilibrium in which physical, chemical, and biological factors are intertwined. The natural cycles of many substances determine the properties of this equilibrium; carbon, nitrogen, oxygen, methane, nitrous oxide, ammonia, hydrogen, phosphorus, sulphur, and many others interact chemically in quantities that attain millions of tons annually. Through these complex interactions, essential parameters such as the percentage of oxygen and nitrogen in the atmosphere, the neutral pH of rain, the levels of ozone in the atmosphere, the level of ultraviolet radiation are maintained constant and proper for life. Processes of similar complexity are involved in maintaining the chemical composition of the oceans, for example the level of salinity (Lovelock, 2000, pp. 68–99).

Living beings and their ecosystems integrate harmoniously with the natural cycles mentioned above—the substances they consume and excrete are part of these natural cycles. The ecosystems are self-sustaining, and, if used carefully and sparingly, they can provide humanity with a virtually endless stream of supplies (Homer-Dixon, 2001, p. 237). But how well do we understand the complexity of living beings and ecosystems? According to Homer-Dixon, one way of estimating complexity is by measuring "the difficulty of creating a mathematical model of it" (p. 116). An example used by Homer-Dixon concerns the molecule of haemoglobin, essential in the metabolism of oxygen. The mapping of DNA, although very important, cannot lead us very far in understanding the functions of this molecule. Proteins have very complex spatial structures, and the sequencing of their atoms can explain only a small part of

their functioning. Soon after being produced by the living organism, the molecules fold themselves in many places along their chains of atoms, and their biochemical functions are largely determined by their folded shapes. The process of folding is not well understood, and it is estimated that a "protein of about one hundred amino acids presents an unimaginable number of folding possibilities, and a supercomputer would need a billion billion billion years to test every one" (Homer-Dixon, pp. 116–118). The process of folding occurs, however, in just a few seconds.

This complexity is probably reflecting the long evolution of life on this planet. Life started at least 3.4 billion years ago and evolved gradually, from simpler to more complex forms, closely adapted to their environment (Stokes Brown, 2007, pp. 19–29). A cell is more complex than a protein molecule; a living being is more complex than any of its cells; and a community of living beings forming an ecosystem is infinitely more complex than any of its members. It is reasonable to think that our level of understanding decreases when the complexity of the system increases, and the inadequacy of our knowledge is probably amplified by what Homer-Dixon defines as "unknown unknowns": "Not only we are often ignorant of critical components, processes, and possibilities in the complex systems surrounding us, we're also often ignorant of our own ignorance" (2001, pp. 172–173). How are humans going to be affected by the destruction of ecosystems, disappearance of fellow species, pollution, and exhaustion of resources? This is still debated, but we know our behaviour leads to the destruction of the inheritance of the earth, the cycle of life that was given to us, and, with it, the intelligence embodied in different forms of life (Arthus-Bertrand, 2009).

Many ecosystems display amazing complexity and beauty, and they are inhabited by living beings that have evolved in and with them for many thousands of years. The ecosystems are irreplaceable for their capacity to sustain life. Humans cannot predict and manage the behaviour of complex natural systems. The failure of a large experiment that took place in the early 1990s illustrates this fact. The designers of the experiment planned to create "an artificial and materially closed ecosystem – a miniature version of the material and life cycles of Earth" (Homer-Dixon, 2001, p. 134).

To accomplish this, they used a facility with a surface of 1.3 hectares and a volume of more than 200,000 cubic metres. Eight researchers were isolated in this facility for 2 years, with the task of studying and managing an environment that included 30,000 tonnes of dirt, air (sealed from the outside atmosphere), water, and 3,800 species of plants and animals. Several small biomes were created inside the complex: rainforest, marshland, desert, ocean, and farm (which should have provided enough food to support the eight people). In spite of the US$200 million spent to build the structure, a multimillion dollar operating budget, unlimited energy and technology available from outside, and the expertise of a team of ecologists and engineers who could in turn consult leading experts, the experiment ended as a failure.

Almost three quarters of the species of vertebrates went extinct, as did all the pollinators, and almost all species of insects. Algal blooms damaged the aquatic habitats, while nematodes destroyed the roots of the crops. Some plants multiplied excessively and had to be continuously weeded; cockroaches and ants swarmed the vegetation; the levels of oxygen plummeted, while the levels of nitrous oxide soared

and the levels of carbon dioxide oscillated wildly (Homer-Dixon, 2001, pp. 135–136). I would also emphasize that in spite of its considerable sophistication, this experiment by far cannot rival the complexity of processes occurring in natural ecosystems.

The ecosystems are also important because we humans (whether we are aware of this or not) belong to nature as well. We are not, as a species, separated from the rest of life: "Our blood . . . has the salt content of seawater. . . . As embryos, our babies still develop temporary gills. . . . Our bodies, like the surface of the planet, are 65 percent water. We belong to Earth in the deepest and most fundamental ways" (Stokes Brown, 2007, p. 17).

Moreover, not only our biology but also our language—and therefore our culture—are deeply influenced by this inheritance. David Abram (1997) gives an example showing that deeper physical exchanges underlie and to a large extent determine our linguistic exchanges:

> If, for instance, one comes upon two human friends unexpectedly meeting for the first time in many months, and one chances to hear their initial words of surprise, greeting, and pleasure, one may readily notice, if one pays close enough attention, a tonal, melodic layer of communication beneath the explicit denotative meaning of the words – a rippling rise and fall of the voices in a sort of musical duet, rather like two birds singing to each other. . . . It requires only a slight shift in focus to realize that this melodic singing is carrying the bulk of communication in this encounter, and that the explicit meanings of the actual words ride on the surface of this depth like waves on the surface of the sea. (pp. 80–81)

The French philosopher Maurice Merleau-Ponty considered language a "profoundly carnal experience, rooted in our sensorial experience of each other and of the world" (Abram, 1997, p. 74). Abram analyzes his work in detail and mentions that Merleau-Ponty was not the only one to establish a link between language and the physical interactions of humans with their world. According to Abram, Merleau-Ponty was preceded in this line of thinking by Giambattista Vico, Jean-Jacques Rousseau, and Johann Herder (p. 76). Examples showing a blurred border between language and nature can be found in art as well. In Shakespeare's words:

> And this our life, exempt from public haunt,
> Finds tongues in trees, books in the running brooks,
> Sermons in stones, and good in everything.[10]

Examples such as Shakespeare's verses or Abram's passage about the "human-birds" chirping to one another can be criticized as biased toward establishing a connection between elements that do not belong together. However, they may indicate that the conceptual meaning of words is supported by a deeper layer, a sensuous exchange between the human being and its surroundings. This type of exchange may bring feeling and passion to an otherwise flat and impoverished communication. Our perceptual life may be drained and depleted if we have a less vigorous environment around us; our world becomes flatter, less sensuous, and this in turn can lead us to impoverished ways of feeling about it. A vicious circle sets in, and soon we are not shocked anymore of having to live most of our lives in a concrete jungle of high-rises.[11] This becomes the new "normal."

The fact that we share a long evolutionary history with other animal species is also pointing to our deep communion with nature. These animals are essential to humans not only for subsistence but also for cultural reasons:

> As Lévi-Strauss has noted, the central problem of anthropology is "the passage from nature to culture" (1963:99). Through animal symbolism, key issues in the nature / culture dichotomy are explored and given concrete expression. As Wilson phrases this process in *Biophilia*, animals are "agents of nature translated into the symbols of culture" (1984:97). Using animal symbolism enables us to confront the beast, relate to it, and, while remaining human, "take on beasthood" and "see our former selves as strange, as from the outside" (Willis 1974:66). Thus we are able to measure and evaluate ourselves, probing the enigma of what it means to be human. (Atwood Lawrence, 1993, pp. 334–335)

It can be argued therefore that living most of the time in artificial surroundings makes our feelings toward the natural world become more flat and impoverished. Unfortunately, the transformations brought by our modern civilization involve much more than feelings: The proliferation of man-made contrivances is accompanied by the disappearance of many forms of life.

Given the finite surface of the planet, the expansion of human activities has a detrimental effect on the living space and the existence of other species. The economic and political decision makers driving this expansion are motivated by specific short-sighted purposes and most often disregard the long-term effects of their actions. Forest destruction and change of land use are commonly occurring as a consequence of

human activities, and they come at a price which is never included in economic calculations: the irreplaceable loss of ecosystems and of the benefits they offer.

There are past occurrences which should have warned us with regard to the dangers of massive deforestation: it has led to the collapse or serious weakening of former or contemporary societies. One example is that of the isolated civilization of Easter Island (Rapa Nui). A few hundred years ago, the inhabitants of this island provoked the collapse of their society through senseless deforestation, although they should have been able to foresee the consequences of their actions (Christian, 2005, pp. 473–475). A more recent example is that of Haiti: The disappearance of the rich forests that once covered the island has generated widespread soil erosion which has damaged the economic potential of the country; and 7 years ago, severe mudslides resulted in hundreds of deaths (Nesmith, 2004, p. 1). Today Haiti is affected by systemic unemployment and underemployment; 80% of Haitians live under the poverty line, 54% live in abject poverty, and the average median age of the population is 20.2 years (CIA World Factbook).

Although in Europe and the United States the area of forest is expanding due to replanting and to population dynamics, in poor tropical countries the forests are destroyed at a frightening pace: "Logging, farming, and cattle ranching are gobbling up around fourteen million hectares of virgin forest a year, or about two hectares every five seconds" (Homer-Dixon, 2008, p. 143). This reflects not only a significant disparity in forest management policies between rich and poor countries but also the fact that rich countries are able to export some of their environmental problems to the developing world. However, such an "out-of-sight, out-of-mind" policy is short-

sighted and deceiving. On the one hand, the destruction of ecosystems affects us all; on the other hand, severe ecosystem damage can have serious social and political consequences by undermining the resilience of nations or even whole geographical regions (Homer-Dixon, 1999, p. 12).

Deforestation occurs on a large scale due to demand for wood in China, Europe and the United States and also due to the clearing of forests to make space for human habitat, agriculture, or farming. In countries such as Indonesia, where illegal logging is widespread, several large forests may be stripped bare in the near future. There are also huge forest losses in Brazil, where in 2002 alone an area of forest larger than New Jersey was lost in the Amazon (Homer-Dixon, 2008, p. 143). The destruction of the Amazonian forest is particularly worrying due to its importance in the climatic functioning of the whole earth and to the enormous complexity of its ecosystems. This system currently hosts half of the biodiversity of the world and accounts for 10% of the oxygen output through photosynthesis (Lynas, 2007, pp. 129–132).

Due to increased demand for beef, soya, and biofuels, people and local governments have strong incentives to clear the forest, build roads, and use the land for agriculture and farming. The land use changes are modifying the pattern of local precipitations, and much of the soil cleared for agriculture is quickly lost through erosion; this, in turn, creates the need for further forest clearing. Moreover, the spread of human settlements increases the likelihood of forest fires, and in 2008 the percentage of the Amazonian forest within 10 km from an ignition source was 28%. Most rainforest trees are poorly adapted to fire stress, and extended tree death is possible (Malhi et al., 2009, p. 20613).

There are indications that the current global warming presents the risk of an overall dieback of the Amazonian forest, and this could have enormous and frightening implications: a positive feedback loop leading to the acceleration of global warming, and a huge potential loss of biodiversity. The reduction of greenhouse gas emissions is essential in minimizing this risk, and the resilience of the rainforest ecosystem can be increased by controlling the spread of human habitat and infrastructures (Malhi et al., 2009, p. 20614). It is utterly irresponsible to destroy the rainforest for short-lived economic benefits while endangering this enormously rich ecosystem and possibly the whole planet.

Unfortunately, humanity has failed to learn the needed lessons from the past. Forest destruction and its consequences are visible in many places. Homer-Dixon writes:

> In my travels in Southern Africa, India, the Himalayas, the Philippines, China, and Mexico, I've seen tens of thousands of square kilometres of land stripped of virtually all vegetative cover and cleaved by washouts and erosion gullies metres deep. . . . It's as if the flesh of the land had been peeled away, with only the bones left to bleach in the hot sun. . . . Without plants to cycle water between the ground and the atmosphere, rains diminish and the land dries out – often turning to desert. (2008, pp. 137–138)

Forests are not the only type of ecosystem endangered by human expansion. Wetlands have long been considered unfit for human use, and they are often filled or drained to obtain land for agriculture or development. Yet their natural role is complex and important. They regulate the water flow in adjacent areas by acting like sponges—

they absorb water when it is wet and release it when it gets drier. Their presence in coastal areas can lessen the effect of extreme weather events on human habitats. They are essential in the natural cycle of carbon, due to the decomposition of plants which contributes to carbon burial, and to the activity of anaerobic bacteria that produce methane (Lovelock, 2000, pp. 67–68). The wetlands are an important source of biodiversity. Their disappearance equals the disappearance of the plant and animal species that compose them.

Wetlands are essential in the purification of water. Studies have proven their capacity to remove nitrates from agricultural runoff water (Dodla, Wang, DeLaune, & Cook, 2008, p. 471) as well as heavy metals from mine or manufacturing operations wastewater (Odum & Odum, 2003, p. 347). The roles of wetlands and their interactions with other ecosystems are still incompletely understood. Their conservation cannot succeed by creating "narrow buffer zones between wetlands and intensive land uses, but rather will require maintaining a heterogeneous regional landscape containing relatively large areas of natural forest and wetlands" (Houlahan & Findlay, 2003, p. 1078). In spite of their importance, half of all wetlands have been lost since 1900 (UNESCO World Water Assessment Programme).

The land obtained through the destruction of forests or wetlands is often dedicated to monocultures. In order to obtain high yields, mechanized agriculture requires an extensive use of fertilizers and pesticides (obtained from oil). These chemicals sterilize the soil, which becomes "little more than the stuff that plants must stick their roots into to hold themselves upright" (Homer-Dixon, 2001, p. 90). Natural soil, however, reflects the complexity of life:

> Bacteria that live in the film of water around soil particles are at work decomposing plant litter and promoting vital chemical processes. Other bacteria form nodules on the roots of legumes and fix the atmosphere's nitrogen so it can be used by plants. Fungi produce webs of filaments that enhance soil structure. Protozoa feed on bacteria and fungi; and nematodes – tiny unsegmented worms – in turn eat bacteria, protozoa, and plant debris. (Homer-Dixon, p. 91)

The destruction of soil biodiversity may pass unobserved, although its effects are potentially important—such as increasing our dependency on oil. Even if we are largely aware of the future effects of greenhouse gases emissions, we have to keep burning more and more oil in order to—among other things—feed ourselves. The soil is only one example of biodiversity loss. The small organisms from the soil disappear together with an enormous number of bigger species, due to the relentless expansion of human habitat and activities.

At the present time, one mammal in four, one bird in eight, and one amphibian in three are threatened with extinction (Arthus-Bertrand, 2009). This large-scale destruction is considered by some scientists as the sixth mass extinction in the history of the planet, and there is substantial evidence suggesting it is already underway (Wake & Vredenburg, 2008, p. 11466). Humans, especially the many of us living in cities, can choose to ignore the loss of other species, which happens most of the time far away from our eyes; and yet, it is terribly short-sighted to continue our "business as usual" while so much of the life surrounding us is being destroyed. Homer-Dixon writes:

> When we change Earth's landscape, we also wipe out our fellow species. Logging of tropical forests, especially, has destroyed habitat and boosted the rate of species extinction, which is now a hundred to a thousand times greater than it was before. . . . And by inadvertently but carelessly transporting aggressive species from their normal habitats to new regions—species like the zebra mussel, the Asian longhorned beetle, and the fungus that causes Dutch elm disease—we've disrupted ecosystems and endangered native species far and wide. (2008, p. 142)

A detailed analysis of biodiversity loss exceeds the scope of this work; I will mention only two more alarming situations: the potential extinction of amphibians and the destruction of coral reefs, the most diverse ecosystems on earth, which host many species of fish, seabirds, turtles, and invertebrates. What I find frightening in both these situations is the large extent—over 30%—of the ongoing destruction. In both cases, there is probably little time left to avoid mass extinctions. A particular vulnerability of amphibians is that they occur most of the time in small geographical areas around the tropics, and if their habitat becomes inhospitable, they have nowhere to go. Aside from the direct effect of global warming on their habitats, there are other synergistic effects. Chytridiomycosis, a fungal disease that has caused massive population collapses in amphibians in Central America, seems to become more virulent as the climate warms (Wake & Vredenburg, 2008, pp. 11466–11470).

Coral reefs are extremely diverse ecosystems, and their potential disappearance would affect a large number of species. They are very sensitive to changes in water temperature, so they are directly affected by climate change. Pollution, overfishing,

ocean acidification, and invasive species also contribute to their distress. Some of the symptoms they exhibit are the following: reduction of live coral between 50% and 93%; reduction of fish populations and other megafauna by at least 90%; disappearance of apex predators; population explosions of seaweeds and loss of complex habitat. The stresses experienced by these ecosystems are so big that many scientists now believe they could be virtually extinct in a few decades. Unfortunately, they are not the only ones: estuaries and coastal seas, continental shelves, as well as the open ocean ecosystems are either endangered, critically endangered, or threatened. In all these areas, the fish populations are reduced by more than half (J. B. Jackson, 2008, pp. 11462–11463). In the words of Suzuki (2011a), the oceans "are a mess, beset not only by overfishing, but dead zones bereft of oxygen, immense islands of plastic debris, and changing pH from carbon dioxide dissolving in the water."

Although the destruction of biodiversity can be unintentional, many times it is done with the purpose of increasing economic efficiency. For example, crops adapted to different soils and climates have ceased to be cultivated in favour of varieties that are most productive and easiest to transport. As a result, three quarters of crop varieties were destroyed worldwide (Arthus-Bertrand, 2009). Standardization is convenient for food production and packaging, but it comes at the cost of increased dependence on a reduced number of species. Whether we consider the natural ecosystems or the modern agricultural and farming operations, the destruction of biodiversity reduces the resilience of the systems and exposes us to great risks. In natural ecosystems, we risk the total collapse of many species, or even whole classes of animals; other species will of course fill the void, but nobody can anticipate the makeup and functioning of the

ecosystems after such vast changes. In agriculture and farming, we overextend our dependence on a reduced number of species, grown in highly integrated operations, in which even small errors can have very serious consequences.

I will conclude this section with a brief examination of two issues that relate exclusively to human activity and contribute to the worsening of stresses imposed on the natural systems: the overexploitation of fresh water, and pollution. There are many indications that humankind is overexploiting the fresh water resources of the planet. Worldwide, groundwater is depleted, the water tables are getting lower, and several rivers have become dry at the mouth for several months a year (Arthus-Bertrand, 2009). Water experts believe that below 1,000 cubic meters per person per year the water supply is scarce and puts economic development at risk. By 2025, if current population trends are maintained, 26 countries from Africa, Central America, Asia, and the Middle East, that already have a limited water supply, will see their per capita water availability diminished by an average of 47% in comparison with 1995 and will all fall below this threshold (Homer-Dixon, 2001, pp. 345–346).

China, the most populous country in the world, is faced with very serious problems regarding its water supply, which can lead to severe environmental and economic consequences. Several important water scarcity issues identified by a Chinese study are: "inadequate, unevenly distributed, and contaminated raw water resources; insufficient supply and treatment infrastructure; and uncoordinated management policies" (He, Xiaoqin, Lei, & Guoping, 2006, p. 388). Homer-Dixon also mentions in some detail the water scarcity problem in China (2001, pp. 346–348). According to Homer-Dixon, the aquifers under Beijing had to be dug originally at 5 to

10 meters deep; in 2000, the water table was at 50 metres and was estimated to fall by a meter each year (2001, p. 347). This would situate the water table at the time of the Chinese study cited above (2006) at roughly 56 metres deep. However, according to the same study, "deep wells drilled around Beijing now have to go as far down as 1,000 meters to reach fresh water" (He et al., p. 387). Even accounting for local variations, such a big difference between anticipated and actual levels of water suggests that the situation is worsening much quicker than anticipated, most likely due to the overexploitation of water. Receding water levels can sometimes lead to the sinking of the land, intrusion of seawater and pollutants into groundwater supplies, and salinization of the soil. This occurs together with the deterioration of ecosystems (He et al., p. 390).

China's situation is not isolated; many countries worldwide are experiencing similar problems—consequences of population growth and economic development—which lead to land use changes, infrastructure development, overexploitation of water resources, and pollution. If the current trends continue, "by 2025 about 3 billion people—or more than a third of the world's population—will live in countries with water stress or chronic water scarcity, a seven-fold increase since 1997" (Homer-Dixon, 2008, p. 144). The earth cannot keep up with this intense overexploitation of water:

> In California's central valley, groundwater is depleted by an average of one cubic kilometre a year. The underground water supplying irrigation in the Midwestern United States is depleted at 12 cubic kilometres a year. In northern Africa and the Middle East, water is being pumped from desert aquifers that

> receive no new supplies. In India's agricultural states, the water table is subsiding half a meter a year. In northern China the Yellow River is drying up, partly due to overpumping of wells. (Stokes Brown, 2007, p. 238)

Unfortunately, human activities increase continuously the requirements for water, in spite of consequences such as groundwater depletion, changes in river flows and water temperature, nutrient runoffs, biodiversity loss, ecosystem destruction, and fisheries collapse (UNESCO World Water Assessment Programme). Moreover, climate changes are usually not taken into account when future water requirements are calculated, although the emissions of greenhouse gases can have serious consequences such as temperature increases and changes in rainfall patterns (Homer-Dixon, 2001, p. 351).

The problems of water scarcity are often compounded by pollution, which, depending on its extent, can change water chemistry or lead to the outright destruction of large ecosystems. One of the most poignant and largely unpublicized examples of pollution occurring in Canada relates to the exploitation of tar sands in northern Alberta. Such operations are far less profitable than the exploitation of fossil fuel deposits (Homer-Dixon, 2008, p. 55). However, economic growth requires more and more oil, and nothing seems to stop us from getting it; although the pollution is catastrophic, the companies that extract oil from tar sands plan to expand their operations. Eighteen barrels of contaminated water are produced for every barrel of oil (Marsden, 2009, p. 158). Aside from the huge amounts of energy required to heat the water in order to separate the oil from bitumen, the chemicals that result from this

process literally destroy whole swaths of land and severely pollute the clean water reserves underneath:

> By 2020, the [toxic tailings] ponds are projected to grow to 220 square kilometres from the present fifty. That would make them equivalent to Alberta's larger lakes. The tailings water has been leaching into the watershed at an estimated rate of *11,000 cubic metres a day* [italics added]. And there have been incidents of serious spills flowing downriver to the Athabasca Delta, where the Cree have found that their fish occasionally smell of burnt rubber or have strange lesions or mutant growths, such as two mouths. (Marsden, p. 159)

The exploitation of tar sands in northern Alberta also has "side effects" such as wiping out the boreal forest, destroying ecosystems, and increasing carbon emissions. The so-called "overburden" that must be removed to gain access to the tar sands "includes topsoil, wetlands, fens, streams, peat bogs, trees and of course wildlife. This boreal forest naturally cleans carbon out of the air, purifies water and produces oxygen and nutrients while supporting wildlife" (Marsden, 2009, p. 160).

Pollution is not restricted to fresh water. The oceans, the soil, the air, and even the outer space near to our planet are severely polluted; I will review very briefly some of the most alarming examples. The oceans are polluted with oil, chemicals, and nutrient runoff; the current rate of carbon dioxide input into the oceans is 50 times the normal rate, which will reduce the pH of the oceans from its natural 8.2 to about 7.8 and will likely lead to the mass destruction of all animals with shells (Lynas, 2007, p. 60). This could have devastating biochemical implications. These organisms are "major components of the cycling of carbon and the CO_2 storage capacity of the

ocean" (J. B. Jackson, 2008, p. 11461). Their destruction, beside unknown ecological effects, could activate a positive feedback loop in the global warming process.

Fertilizers and pesticides constitute another significant source of pollution. In order to be efficient, farming operations use monocultures, which can be sown and harvested mechanically. Monocultures require the use of pesticides to prevent diseases and destroy parasites, while fertilizers provide the large quantities of fixed nitrogen needed by the plants. The use of fertilizers and pesticides leads to the contamination and sterilization of the soil, as has been mentioned. Moreover, the runoff of these chemicals pollutes the rivers and ultimately the ocean. Due to nitrogen and phosphorus runoff from fertilizers, each spring and summer, off the Louisiana coast, an area sometimes as large as 20,000 square kilometres becomes so devoid of fish and large life forms that it is called "the dead zone" by scientists and ecologists (Homer-Dixon, 2001, p. 68).

Plastic pollution is an increasingly worrying problem. As of 2009, the world produced 240 million tons of plastic per year, and a significant part of it, especially bottles and packaging, ended up as waste. Most of plastic waste is not biodegradable and persists in the environment for hundreds of years, leaching various toxic chemicals such as phthalates, bisphenol A, softeners, flame retardants, and others (Boote, 2009). These substances pollute the environment, get into the food chain, and ultimately in our bodies. Hundreds of scientific studies have found relationships between these substances and various medical conditions such as asthma, obesity, brain disorders, cancers, and allergies (Boote). Some of these substances persist for a very long time inside our bodies: In the case of polychlorinated biphenyls (or PCBs) it takes on

average 10 years "to remove half of a quantity of PCB contamination from the human body" (Greenberg, 2010, p. 51). As a consequence, "a person who ingests a sizable quantity of PCBs in his teens will likely be carrying around at least some of the chemical until he dies" (Greenberg, p. 51).

Plastic pollution also affects the ocean: "A 'plastic soup' of waste . . . now covers an area twice the size of the continental United States" (Marks & Howden, 2008). The pollutants from plastic affect marine organisms and lead to anomalies such as intersex (male-female) fishes. In humans, the same substances affect the functioning of hormones and have been linked to low sperm counts, fertility problems, abnormal fetal development, and miscarriages (Boote, 2009). Due to the contamination of the food chain, these substances have been found in the bodies of humans everywhere, including the Inuit and the Amazon Indians (Boote).

The air is polluted with gases and particulate matter; in some regions, this phenomenon is worse due to rapid economic growth and weak environmental regulations; in China alone, two new coal plants are built each week (Arthus-Bertrand, 2009). Also, the number of cars in China grows each day by 14,000 (Bicks, 2009). An increase of more than five million cars per year contributes not only to pollution, but to an increase in oil consumption as well.

Finally, the outer space close to our planet is severely polluted with millions of objects that orbit the Earth and constitute a severe collision hazard for space aircraft; this can have a direct impact on future space exploration. Examples of such objects can be: spent rocket stages, hardware, frozen coolant, or explosion debris. The seriousness of this problem has led to the establishment of the Inter-Agency Space Debris

Coordination Committee (IADC), with a membership composed of the space agencies of Italy, Great Britain, France, China, Germany, the European Union, India, Japan, the United States, Ukraine, and Russia (IADC, 2006).

The topic of pollution is extremely complex, and the few examples given can serve only as brief illustrations. The space limitations of this work oblige me to choose only the examples I consider most alarming; this is also what I have done previously when I reviewed the importance of ecosystems, the forest destruction and change of land use, the destruction of biodiversity, and the overexploitation of fresh water. The detrimental actions perpetrated by humans against their best long-term interests have resulted in significant modifications in the natural systems, which, beside the problems already enumerated, show signs that considerable climatic changes are underway. This topic is the subject of the following section.

Indicators of Impending Climate Change

Many of the changes observed in nature in recent years are consistent with global warming. I will review only a few of them, pertaining to changes in the extent and thickness of the Arctic ice cap, the thawing of glaciers, sea level rises, and changes in oceans due to warming and acidification. It is sometimes difficult to separate the indicators of climate change from their likely consequences, because they pertain to the same phenomena. However, the following arguments will be focused on indicators; the consequences of climate change will be analyzed in the last part of this discussion on nature.

The average temperatures recorded in the Northern Hemisphere during the second half of the last century were likely the highest in the last 1,300 years (IPCC,

2007, p. 30). Moreover, the 10 warmest years ever occurred within the last 18 years (Gore, 2006). The changes can be observed everywhere:

> Changes in the ocean and on land, including observed decreases in snow cover and Northern Hemisphere sea ice extent, thinner sea ice, shorter freezing seasons of lake and river ice, glacier melt, decreases in permafrost extent, increases in soil temperatures and borehole temperature profiles, and sea level rise, provide additional evidence that the world is warming. (IPCC, 2007, p. 37)

The biggest effects of global warming can be seen in the Arctic (McKibben, 2010, p. 4). The thawing of the Arctic ice cap is exceeding by far the worst case scenario anticipated by the climate models of the Intergovernmental Panel on Climate Change (IPCC) 2007 Fourth Assessment Report (AR4). For example, the minimum sea ice extent in September 2007 was 1.2 million square kilometres smaller than the 2005 minimum, and it is believed that sometime in the following decades the Arctic will become ice free during the summer (Allison et al., 2009, p. 31). The thawing process is advancing at a high pace, and it is likely to accelerate as the extent of ice diminishes. Ice reflects back into the atmosphere 90% of the incoming solar radiation, while the blue ocean water absorbs 90% of it; it is therefore anticipated that while much of the ocean becomes ice free, the thawing of the remaining ice will occur faster (Gore, 2006).

There is also evidence suggesting that the Arctic may not become ice free gradually, but abruptly; this in turn may trigger rapid warming on land and the degradation of permafrost (Allison et al., 2009, p. 32). Sudden changes have been also

observed in Antarctica in 2002, when 3,250 square kilometres of the Larsen B ice shelf have collapsed in just 5 weeks (Ritter, 2009, p. 11). It is possible that the disappearance of the Arctic ice leads to unexpected changes in the planetary climate. Homer-Dixon warns that "we are rarely able to predict the sharp shifts in the behaviour of complex systems" and that small incremental changes may sometimes lead to the sudden shift of the whole system to a new state (2001, p. 69).

Not only the ice surface, but the ice thickness is also decreasing in the Arctic. A 2009 study shows that between 1980 and 2008 the mean thickness of ice in the winter has decreased from 3.64 metres to 1.89 metres, a decrease of 1.75 metres, or almost half (Allison et al., 2009, p. 32). The fact that the ice is shrinking and thinning is already taking a toll on the Arctic ecosystems, and its disappearance will make this problem much worse. There are already reports of polar bears drowning because the distances that they have to swim are becoming too big (Gore, 2006).

The Arctic ice cap is made of floating ice, and its melting will not have any noticeable effect on the sea level. However, the melting of land ice in Greenland and Antarctica will lead to sea level rises. This phenomenon is already happening, and in the future it is likely to impact seriously many coastal cities if nothing is done to slow down global warming. Right now, the sea levels are rising 80% faster than previously predicted by the IPCC, and the total rise could be as high as 2 meters by 2100 (Allison et al., 2009, p. 9).

The thawing of glaciers is another worrying sign of global warming. Glaciers are melting on all the important mountains and at the Poles (Homer-Dixon, 2008, p. 155). However, I will limit the discussion to only one example: the glaciers of the

Himalaya. They serve an essential role in regulating the water flow over a region that is home to more than 2 billion people. During the winter months, the glaciers capture humidity from the atmosphere and store it as ice, and during the summer months they release fresh water that is used for subsistence and agriculture. Currently they melt at an alarming rate, and their disappearance could lead to droughts and famine (Lynas, 2007, pp. 87–88). It has been forecasted these glaciers may disappear completely as early as 2035, although lately this estimate has been contested (Hogue, 2010).

The droughts are yet a future threat, but people from the affected areas are facing already the danger of floods. Due to the temperature increase, glacial lakes expand and merge; their waters can burst through the edge of the glaciers and inundate the valleys below. Such incidents have happened in the past, and the only defence against their reoccurrence is to dig and expand the outlet channels of the lakes in order to allow them to drain. Since the countries of that region are poor and the terrain is inhospitable, this is often achieved with primitive means: Shovels and ropes are used to move boulders as heavy as 150 kilograms (Nayar, 2009, pp. 1042–1043).

Shrinking ice caps, melting glaciers, and rising sea levels are not the only indicators of global warming. Significant changes are also happening in the oceans. There are large increases in oceanic heat content, in the upper ocean (0–700 metres deep), as well as in the deep ocean (Allison et al., 2009, p. 37). The increased heat absorption raises the temperature of the oceans, which reduces their capacity to capture carbon dioxide; this has the potential to activate another positive feedback loop in the global warming process. There are also changes in the salinity of the oceans; in the Arctic there is evidence of glacier melting and increased river runoff. The changes in

temperature combined with the changes in salinity could slow down the North Atlantic Ocean circulation, with severe effects on the climate of northern Europe, which may become much colder (Lynas, 2007, p. 10). Changes in the thermohaline circulation have led to abrupt and substantial climate changes in the past: "11,500 years ago, the average temperature of the region stretching from North America across the North Atlantic to central Europe warmed by seven degrees Celsius in just thirty years" (Homer-Dixon, 2001, p. 137).

The unprecedented release of carbon dioxide into the atmosphere due to anthropogenic gas emissions has led to the reduction of the ocean pH from 8.2 to 8.1, and the estimate for the end of the century is a further reduction to 7.8; this will weaken and eventually destroy calcifying organisms and coral reefs (McKibben, 2010, pp. 9–10). Finally, there is increased evidence of very large ocean areas that lack oxygen. This weakens the ability of ocean life forms to deal with the stresses caused by the increased acidity; recent studies show the potential for widespread expansion of the oxygen-deprived areas in the oceans, should the emissions of carbon dioxide continue to increase (Allison et al., 2009, p. 38).

Global warming could have very serious consequences; an analysis of several possible scenarios is needed, because it will highlight the choices that humanity (still) has in mitigating the worst effects of climate change.

Possible Consequences of Climate Change

Many times in the past, humans have not been able to manage their relationship with the environment harmoniously. Stokes Brown (2007) notes that human habitats have often been abandoned for unknown causes at the end of periods of technological

advance; it is likely that overgrazing, deforestation, and environmental degradation have been contributing factors (pp. 123–126). The main difference between past crises and the current one is its scale; for the first time, humanity is able to influence the planet as a whole. According to Homer-Dixon (2008), "we're now a physical force on the scale of nature itself, disrupting the deepest processes of natural systems like Earth's climate, and massively changing global cycles of carbon, nitrogen, phosphorus, and sulphur" (p. 13). Our technological power makes us think that nothing bad can happen to our civilization, and we end up being overly confident: "We are losing . . . a sense of how strange the world is, and of the limits, ultimately, of our knowledge and control. We are losing the awe, the respect, and the recognition of mystery that remind us to be prudent" (Homer-Dixon, 2001, p. 95).

According to the IPCC AR4:

> The equilibrium climate sensitivity is a measure of the climate system response to sustained radiative forcing. It is defined as the equilibrium global average surface warming following a doubling of CO_2 concentration. Climate sensitivity is *likely* to be in the range of 2 to 4.5°C, with a best estimate of about 3°C and it is *very unlikely* to be less than 1.5°C. (2007, p. 38)

The terms *likely*, *very unlikely*, and other similar ones used by the IPCC in the report reflect specific degrees of mathematical probability.[12] I will use italicized words for these terms in the following discussion pertaining to the IPCC report. The above passage gives a very succinct overview of the possible scenarios in the case that CO_2 concentration in the air reaches 560 ppm, a doubling from the preindustrial levels. In such a case, there is a probability bigger than 66% that the additional warmth radiated

and the possible feedbacks would force the average temperature of the earth to go up "in the range of 2 to 4.5°C, with a best estimate of about 3°C." The probability of the average temperature going up by less than 1.5°C is less than 10%. These various percentages of probability reflect the *ranges of uncertainty* that existing models have in estimating how different factors (carbon dioxide, other greenhouse gases, ozone, aerosols, clouds, land cover changes, volcanoes, changes in the orbit of the earth and in the activity of the Sun) are going to influence the climate (Hansen, 2009, pp. 5–10). Moreover, we need to take into account not only the radiated heat but also the different feedbacks that can make the average temperature higher (positive feedback loops) or lower (negative feedback loops). After all the feedbacks had played their part, the system would reach a new equilibrium.

Potential feedbacks include water vapour, clouds, decreased albedo due to ice melting, potential release of greenhouse gases (mainly methane) from the frozen permafrost, the reduced capacity of the oceans to absorb carbon dioxide due to warmer waters, potential release of methane from calthrates situated in the depths of the oceans, potential disappearance of the Amazonian forest, and potential slowdown or stopping of the thermohaline circulation. There is high uncertainty regarding the mechanisms or thresholds that control these feedbacks and also regarding their interaction with one another.

Methane (CH_4) is a greenhouse gas about 20 times more potent than carbon dioxide (Lovelock, 2009, p. 79). The release of methane from the frozen permafrost following the warming of the Arctic would induce an important temperature increase. There are indications this process has already started. There are intense emanations of

methane from Russia's northern regions (Hedges, 2009, p. 185), which are estimated to be 63% higher than previously thought (Paskal, 2010, p. 84). Smaller quantities of carbon dioxide will be absorbed by the oceans due to the reduced capacity of warmer water to dissolve it; and finally, very large quantities of methane could be released from the bottom of the oceans once the calthrates become unstable because of the temperature increase. For these reasons, scientists fear that beyond an increase of 2°C there is a risk of starting an uncontrollable chain of events that could bring catastrophic climate changes.

In absolute numbers, the projected temperature increases may not look alarming, but they could bring sweeping changes to our environment. During the last ice age, 20,000 years ago, the average temperature was 5 degrees colder than today (Hansen, 2009, p. 8). At that time the sea level was 350 feet lower (Hansen, p. 71). The Earth has also been hotter, and the higher temperatures had a considerable impact on the sea levels: 130,000 years ago, when the Earth's average temperature was 2 degrees higher than the 1900 level, the sea levels were 4 to 6 meters higher; and 30 million years ago, the last time the Earth's average temperature was 3 degrees higher than the 1900 level, the sea levels were 20 to 30 meters higher (Homer Dixon & Garrison, 2009, p. 17).

Another important factor that we need to consider is the speed of the current climate changes:

> There is nothing wrong with the Eocene climate; there is no inherent reason we should prefer our crocodiles in the Florida Keys rather than on Axel Heiberg island. The climate risks come from the rate of change, not because the current

> climate is some magic optimum for life. Our infrastructures, our crops, the very locations of our coastal cities have evolved for the current climate. The slow adaptation that has anchored us to the current climate puts us at risk if climate changes fast. (Keith, 2009, p. 42)

Why then, if climate change threatens our civilization so severely, is no action being taken to prepare us to deal with its consequences? I advance here three possible answers: the actions of climate change deniers; the very large range of the forecasted increase in the average temperature of the planet as a consequence of global warming (the values advanced by the IPCC are between 1.1°C and 6.4°C); and finally, because the Western society as a whole is unable to challenge and change its habits. I will continue with a discussion about the actions of climate change deniers, and I will conclude this chapter with an examination of recent scientific evidence to determine if a more precise anticipation of the temperature increase of the planet could be made at the present time. An analysis trying to determine why people living in the Western world seem unable to question their choices will be the subject of Chapter Four.

The arguments of climate change deniers are neither scientifically sound, nor are they constructive. Climate change deniers are not interested in scientific truth; they do not like the implications of climate change, so they have decided that climate change does not exist—they will use any argument, no matter how disreputable, to justify their denial (Krugman, as cited in Parris, 2009, p. 44). I recently had the opportunity to listen directly to some of the objections of climate change deniers. The 44th Annual Congress of the Canadian Meteorological and Oceanographic Society (CMOS) was held in Ottawa between May 31 and June 4, 2010, together with the 36th

Annual Scientific Meeting of the Canadian Geophysical Union (CGU). This was the third joint CMOS-CGU congress; over 900 delegates were present, and more than 700 scientific papers were presented. On June 2, 2010 I attended an event sponsored by CMOS-CGU that was open to the public. The speaker was Dr. Warwick Vincent from Laval University, a reputed scientist with more than 30 years experience researching the Arctic and Antarctic ecosystems; his lecture was entitled "Our melting poles: Where life on Earth is changing."

It was an excellent presentation, based on many years of direct observation and careful measurements of many parameters related to the functioning of Nordic continental environments. All the phenomena observed point to a dramatic and accelerated heating of the Arctic: The permafrost line, which was stable for probably thousands of years, has moved to the North 130 kilometres in the last 30 years; the largest movement occurred in the last 10 years, and the road infrastructure is severely affected. There is increased bacterial activity in the thaw lakes, which leads to emissions of methane, and the shrubs advance to the North, reducing the reflectivity of the snow. There are major changes in the animal populations, such as red foxes coming into the territory of Arctic foxes, fish appearing in waters once populated only by narwhals and walruses, and a decrease in the numbers and health status of polar bears (Vincent, 2010). The lecture also included a video from the British Antarctic Survey, a leading British environmental agency conducting research activities in Antarctica.

After the presentation was finished, the floor was opened for questions. The first intervention came from a congress delegate who praised Dr. Vincent for his

lecture but at the same time said that he was "quite shocked" to see that in the video from the British Antarctic Survey it was stated that human activity was the most likely cause of the current climate change. Since there is no scientific agreement on this matter, it would have been more appropriate to state a few of the opinions of those in favour and of those opposed, to set the stage for a democratic debate. Dr. Vincent's reply was that democratic debates are valuable, but most of the time they ignore the scientific merit of the debaters' opinions. Since they are *democratic*, the point of view of a blogger gets approximately the same weight as the point of view of a reputed researcher, and this, from a scientific point of view, introduces an unacceptable bias. There is ample and unequivocal scientific evidence showing that the current climate warming is due to human factors and not to natural ones.

The second intervention came from another congress delegate who mentioned that according to several sources, oil supplies have already reached their peak. If oil production soon starts to fall, so will the emissions of CO_2; the question for Dr. Vincent was whether his models have taken into account this future reduction in emissions. The answer made it clear that the lecture did not present any *models*, but only direct observations; these observations show clearly that changes are happening, and at an increasing pace. These changes in the Arctic are likely to influence the overall climate of the Earth, so they may soon impact the lives of most people. Several members of the public grumbled during this intervention, and a couple of them commented that while oil resources may be dwindling, there are still abundant reserves of coal; however, none of them came to the microphone. I think this objection was not only unrelated to the presentation but entirely invalid: It has not yet been proven that

conventional oil production has already peaked; even if this were true, nonconventional oil sources such as the tar sands could make up for the loss (Homer-Dixon & Garrison, 2009, p. 10). Moreover, less oil does not necessarily mean CO_2 emissions are going to fall; synthetic fuel can easily be obtained from coal (Keith, 2009, p. 34).

There was a third intervention, which dealt specifically with clarifying one of the issues presented during the lecture; after that I asked Dr. Vincent to comment on the likely speed of the coming climate changes. A graph representing data traced back several hundred thousand years and showing the correlation between the average temperature of the earth and the concentration of CO_2 in the atmosphere was shown during the lecture. In it, one could see that the average temperatures and CO_2 concentrations remained relatively stable during the glacial periods as well as during the hot periods; however, the switch between hot and glacial periods has been often abrupt. I asked Dr. Vincent to elaborate on this aspect. In his reply, he mentioned that historical data show indeed that in the past climate change has often occurred fast; from the point of view of the human civilization, such an abrupt change would be very detrimental, because many of our settlements and infrastructure are based on the assumption of a constant climate. Should the climate change too fast, the ability of the human civilization to respond to the changes could be compromised.

The last question came from the conference organizer, who asked Dr. Vincent to comment on the recent massive oil spill in the Gulf of Mexico. His answer was that the inertia of the economic system is so significant that even events of such magnitude

can hardly alter its course; the Canadian government has already sold drilling rights to oil companies for the off-shore exploitation of oil resources in the Canadian Arctic.

The first two interventions have attempted to give the unsubstantiated impression that some important aspects, having the potential to disprove the arguments of the lecture, have been omitted. Save for the clear answers given by Dr. Vincent, an objective observer of these exchanges could have doubted that climate change is really happening or that it is important. This is a crucial point, because most often the media presents opinions, not conference proceedings, and the public can be easily misinformed. This danger could be diminished if the scientists would show more resolve in promoting their point of view and trying to influence the public opinion using scientific arguments.[13]

While scientists often hesitate to promote their views, special interest groups do not; some even argue that "a warmer world will be a safer and healthier world for humans and wildlife alike," and that "the *net* effect of continued warming and rising carbon dioxide concentrations in the atmosphere will be beneficial to humans, plants, and wildlife" (Idso & Singer, 2009, p. III). Such views are either ignored or quickly dismissed by the scientific community, but we should maybe pause and think whether they accomplish anything important. I think they do: By coating their "research" with a scientific veneer, they promote uncertainty in the perceptions of the general public about climate change (Scannell & Grouzet, 2010, pp. 97–98). As a consequence, even when presented with solid scientific evidence, people are less likely to act. Moreover, "politicians are unlikely to take concerted action now in the interests of the future as

long as they can argue that 'experts are divided' or that 'more research is needed'" (Kennedy, as cited in Lowe, 2008, p. 250).

There are two main sides of the debate between climate scientists and climate change deniers: the scientific aspect and the public aspect; I will deal with both aspects in the paragraphs below. The NIPCC (Nongovernmental International Panel on Climate Change) is one of the most vocal groups of climate change deniers; I will start with a few arguments that will refer mainly to them, but they could apply to other similar groups as well. Regarding the scientific side of the debate, there is no doubt that the claims of the NIPCC are ungrounded. I read their report *Climate Change Reconsidered* (Idso & Singer, 2009), and I am comfortable saying this is not science, but propaganda. I am aware this may seem like a simplistic criticism, but I will present shortly what I believe is a pattern of distorting evidence in a way that maintains a scientific appearance but is deeply misleading; this pattern can be found throughout the whole report. The scientists may have won on this side of the debate—but only in *their circles*. The large public is not aware of this victory and, therefore, it may not matter much.

The second side of the debate is public. Here, the advantage of the IPCC over the NIPCC all but disappears. Very often, on the plain, level field of public opinion, image matters more than science. Although many of their arguments are shallow—such as the ones about all layers of life thriving in the new hot environment—they are carefully presented in long articles that *apparently* are scientific. Because at the first glance these articles seem credible, an unadvised reader would most likely be swayed by the "arguments." But after reading for a while the pattern emerges: Whatever the

IPCC has said has to be contradicted. Cherry-picking the evidence, citing out of context, adding unrelated studies to the reference list, every technique is allowed as long as the goal of contradicting the IPCC is attained.

In the report of the IPCC and the studies referenced in it, one can find that the initial working hypotheses are often proved, but sometimes disproved—and rightfully so, because if everything were known in advance, there would be no purpose for conducting the research. This is not the case with the NIPCC: Almost each article starts with a study of the IPCC, which at the end is *always* refuted. Such uniform results cannot be substantiated, and a reasonable conclusion is that the intended objective of the "research" is to contradict the findings of the IPCC by any means. Unfortunately, the views of the NIPCC and other climate change deniers get a disproportionate amount of attention in the media, without consideration to the complete lack of scientific merit of their views. According to Stern (2009), "the noise made by deniers continues to be loud, in relation both to their modest numbers as well as the poverty of their thinking" (p. 36). However, the public forms its judgments based on what appears in the media, so, from this point of view, the "noise" is highly effective.

This is not occurring by chance; it is the result of a deliberated effort. In spite of the overwhelming weight of the scientific evidence showing that humans are responsible for the current global warming (Hansen, 2009, p. 49), and that we need to change course very rapidly to avoid severe consequences (Hansen, p. 277), many in the general public (4 people in 10 in the U.S. according to a survey) believe these problems to be exaggerated (Hoggan, 2009, p. 48).

The interest groups behind this deliberate effort to deny or minimize climate change or to exaggerate the costs of dealing with it use a variety of tactics in order to discredit the scientific evidence, to intimidate those who speak or act in favour of climate change policies, and to generate confusion in order to thwart effective action against the status quo. Some of these tactics are the following:

Think tanks create and finance "grassroots organizations" that conduct workshops or debates on climate change in order to sow doubt (Hoggan, 2009, p. 46). The "scientists" who participate in these activities do not have any credentials in climatology but are skilled enough to make their arguments sound legitimate (Hoggan, p. 47). In turn, the think tanks themselves are financed by the fossil fuel industry (Hoggan, p. 77).

Special interests use "spin doctors" to manipulate the language and distort the debate on climate change, with the purpose of leading the population into believing that the science is still unsettled or that environmental policies are prohibitively expensive (Hoggan, 2009, pp. 65–66). As a result "we have moderate, reasoned, and commonsense language to describe immoderate, unreasonable and insensible government policy" (Hoggan, p. 67). Sometimes, the lack of honesty and the disregard for the public interest is made obvious by the "spin doctors" themselves: "Corporations, trade associations, and politicians have a responsibility to communicate in a way that *makes it most likely that the public will support* [italics added] where they stand" (Luntz, as cited in Hoggan, p. 71).

The numbers and scientific credentials of climate change deniers are exaggerated to give more credibility to their claims; sometimes the opinions of reputed

and credible scientists are distorted or outright lies are posted on their behalf so they appear as endorsing the opinions of the deniers (Hoggan, 2009, pp. 93–95). One would expect that if such scientists express their outrage in strong-worded letters the "errors" would be corrected, but this is not the case: "The original article and the links to the 'coauthor' list remain on the Heartland Institute Web site. No apology. No correction. No acknowledgment that the list of five hundred purported deniers is largely if not entirely misrepresented" (Hoggan, p. 96).

Finally, "whether through inadvertence, understaffing, or, in certain outlets, an actual intent to misinform, many major media outlets in North America, and to a lesser extent, in Europe" fail to present to their audiences the severity of the climate crisis, which "is surely the most important and dangerous environmental issue in the history of humankind" (Hoggan, 2009, p. 153). In 2011 I followed for about a month the main news presented by several popular Internet sites, and I found that very few of the important domestic and international issues (climate change notwithstanding) were adequately reported on.[14] I believe therefore that Hoggan's remarks could apply to many other domains and not only to climate change. Following the consolidation of the media sector, a few companies now control large parts of the mainstream media, and one can be easily manipulated unless he or she is critical in evaluating the information presented, a task not always easy.

As a result of the deliberated efforts described above, we often end up disregarding the consequences of climate change for humans, for our civilization, and for other species and ecosystems. The IPCC is making several forecasts regarding these consequences (IPCC, 2007, p. 48). It is *likely* (probability greater than 66%) that

the resilience of many ecosystems is going to be broken. The impact of climate change is going to be combined with phenomena such as flooding, drought, wildfire, insects, ocean acidification, land-use change, pollution, and overexploitation of resources. Global food production has a potential to increase if the increase in temperature has a range of 1 to 3°C, but above this range is projected to decrease. The coasts are going to be affected by the rise of the sea level and many people are going to experience floods every year. Consequently, the coastal settlements and those in river flood plains are going to be very vulnerable; the poor areas are going to be impacted especially hard. The health of many people is projected to be affected by an increase in malnutrition as well as by increased illnesses and injuries due to extreme weather events (IPCC, pp. 48–50). Ocean acidification is expected to affect the corrals and shell-forming organisms, and the likelihood of extreme weather events is going to increase. It is *very likely* (probability greater than 90%) that heat waves will increase in frequency over most land areas, accompanied by heavy precipitation events. It is *likely* (probability greater than 66%) that areas affected by drought will increase, as will the intensity of tropical cyclone activity. There is also an increased risk of abrupt or irreversible changes (IPCC, pp. 52–54).

According to the estimates provided by the IPCC AR4 (2007, p. 45), the average warming of the planet by the end of this century will be somewhere between 1.1°C and 6.4°C, depending on which development scenario will be followed by humans in terms of population, economic growth, and energy use. Having an array of development scenarios associated to various temperature increases leads to a similar array of possible consequences, out of which some are relatively easy to deal with

while others are undeniably catastrophic (Lynas, 2007). This wide range of alternatives is used by climate change deniers to delay action because the anticipations of the IPCC are too uncertain. Being able to anticipate more precisely the probable temperature increase of the planet makes it possible to focus on a specific temperature increase and its likely consequences.

In the following I will review the alternatives available at the present time (the IPCC AR4 was published in 2007) and examine what would be the likely temperature increase if we consider the most favourable of them. I used for this analysis four very reliable sources, and I obtained similar results, which is encouraging from the point of view of this assessment. We need however to keep in mind that as time passes, our choices will narrow significantly. I will start by presenting a succinct table that links future trends in CO_2 emissions to the levels of atmospheric CO_2 that are likely to result, and finally to increases in the average temperature of the planet. Table 1 summarizes the research of hundreds of scientists and only peer-reviewed publications have been used (Lynas, 2007, p. XXII). I will discuss the first three intervals of temperature increases shown in Table 1, from zero to 1, from 1 to 2, and from 2 to 3 degrees Celsius. I will not discuss temperature increases of 4°C and over because their consequences are catastrophic.

We can see already that it is most likely impossible to avoid a temperature increase of 1 degree Celsius; we passed the 350 ppm threshold in 1987—today we are at a level of 393 ppm, and we add 2 ppm each year. We may still have a marginal chance to avoid a temperature increase of 2°C. For this we will need to eliminate all CO_2 emissions from coal by 2030 (Hansen, 2009, pp. 184–185) and not use *any*

Table 1

Possible Temperature Increases in Relation to the Level of Atmospheric CO_2.

Degree change	**Actual temperature in Celsius**	**Action needed**	**CO_2 target**
One degree	0.1 – 1.0°C	Avoidance probably not possible	350 ppm (today's level is *393 ppm*)
Two degrees	1.1 – 2.0°C	Peak global emissions by 2015	400 ppm
Threshold for carbon cycle feedback...			
Three degrees	2.1 – 3.0°C	Peak global emissions by 2030	450 ppm
Threshold for Siberian methane feedback...			
Four degrees	3.1 – 4.0°C	Peak global emissions by 2050	550 ppm
Threshold for oceanic methane hydrate release...			
Five degrees	4.1 – 5.0°C	Allow constantly rising emissions	650 ppm
Threshold for elimination of most life on Earth...			
Six degrees	5.1 – 5.8°C	Allow very high emissions	800 ppm

Note. From *Six Degrees* (pp. 274–275), by M. Lynas, 2007, London: Fourth Estate.

"unconventional fossil fuels (e.g., oil shale and tar sands)" (Kharecha, Kutscher, Hansen, & Mazria, 2010, p. 4050).[15] We could still continue to use oil and gas from conventional (most readily available) sources until new technologies are made available to replace them as sources of energy. Phasing out CO_2 emissions from coal should be accompanied by the "elimination of fossil fuel subsidies and a substantial rising price on carbon emissions" (Kharecha et al., p. 4050). A financial mechanism (that will be described further) can ensure the population is protected in a fair way from the effects of the rising price on emissions (Hansen, pp. 209–210).

I consider the chance of avoiding a temperature increase of 2°C as marginal because it would require something similar to a global warlike effort in order to peak emissions extremely quickly: "We just barely have time to phase in technologies for the era beyond fossil fuels, even if we begin now with an 'all hands on deck' strategy" (Hansen, 2009, p. 176). It is important to note however that *if* this scenario would materialize, "it is possible to keep maximum carbon dioxide close to 400 ppm, and in a period of several decades to get it back to 350 ppm and below" (Hansen, p. 176).

Unfortunately there are no signs of such an all-out effort, so in the absence of an unforeseen major development, the threshold of 2.0°C / 400 ppm will be passed. The next interval is from 2.0°C / 400 ppm to 3.0°C / 450 ppm, with an emission peak in the year 2030. In this interval positive feedback loops will be activated, leading to further carbon dioxide increases (see Table 1); there is a danger these positive feedback loops could lead to the melting of all the ice in the Arctic and Antarctic regions in a few centuries. This will lead to sea levels 75 metres higher than at the present time (Hansen, 2009, p. 160). Avoiding a level of atmospheric CO_2 higher than

450 ppm may still be an attainable objective, but it remains to be seen if our technical capabilities and especially our political will be able to make this objective a reality.

Another inference regarding the probable temperature increase that lies ahead of us can be obtained from the data provided by the IPCC AR4; I am aware this inference is drawn by choosing from several development scenarios below and can be seen as somewhat subjective; however I believe my choice of the most likely scenario can be justified. According to the IPCC (2007), the possible development scenarios that could be adopted by our civilization are the following:

The A1 scenario[16] assumes "very rapid economic growth, a global population that peaks in midcentury, and rapid introduction of new and more efficient technologies" (IPCC, 2007, p. 44). Two characteristics are very different from our world today, and unless there are significant changes in the near future, this scenario does not seem too likely. These two characteristics are the very rapid economic growth and the rapid introduction of new technologies. The last point may seem debatable, but in my understanding these technologies should be able to efficiently reduce or even replace fossil fuels as our choice source for energy, and there have been no significant developments in this field lately. At the same time, economic growth has been sluggish for the last 3 years, and it is anticipated that it will remain so for 2 more years (Wong, 2011). It is therefore not appropriate to describe the world economic growth as "very rapid"; for these reasons I think the A1 scenario is unlikely to materialize.

The B1 scenario describes a world with the same population as A1, "but with more rapid changes in economic *structures* [italics added] toward a service and information economy" (IPCC, 2007, p. 44). Although service and information are

important economic sectors in the world today, the main economic engine remains the production of manufactured goods. For this reason I think this scenario is significantly different from the path we are likely to take.

The B2 scenario "describes a world with intermediate population and economic growth, emphasizing *local* [italics added] solutions to economic, social, and environmental sustainability" (IPCC, 2007, p. 44). This world differs radically from ours, with its emphasis on free trade and globalization, and for this reason I think the B2 scenario is very unlikely to materialize.

The A2 scenario "describes a very heterogeneous world with high population growth, slow economic development and slow technological change" (IPCC, 2007, p. 44). I will emphasize again that the IPCC does not attach any likelihood to these scenarios, but I find this last scenario as being the one that most closely resembles our world today; therefore I think it stands a fair chance (unfortunately) to represent our future development. The estimated temperature increase in this scenario is 3.4°C (IPCC, 2007, p. 45).[17]

The third inference can be drawn from Hansen's (2009) comprehensive work, which deals with the scientific, economic, and political aspects of climate change. Hansen is one of the foremost climate scientists in the world today; he has drawn attention to the climate change crisis since the 1980s and has been "frequently called to testify before [the U.S.] Congress on climate issues" (p. 304). Hansen emphasizes the need for urgent action to reduce emissions, to avoid initiating a series of positive feedbacks[18] that will dramatically modify the climate of the earth[19] and could, in the worst case scenario, lead to a "run-away greenhouse" effect that could ultimately

"destroy all life on the planet" (p. 236). In Hansen's view, our current path is extremely irresponsible: "With carbon dioxide the dominant climate forcing, as it is today, it obviously would be exceedingly foolish and dangerous to allow carbon dioxide to approach 450 ppm" (p. 160). If we maintain our present course, we will be in this situation in 25 years.

Hansen (2009) proposes what I see as a viable economic solution to the climate crisis: to withdraw all subventions to the fossil fuel industry, followed by the introduction of a "fee-and-dividend" taxation system which will ensure that "100% of the money collected from the fossil fuel companies at the mine or well is distributed uniformly to the public" (p. 209). Such a system would quickly gain the confidence of the public because of its transparency and would not require a complicated bureaucracy to manage it. While people who own big residences or travel a lot would pay more under this system than the dividends they would receive (p. 210), "those who do better than average in reducing their carbon footprint will receive more in the dividend than they will pay in the added costs of the products they buy" (p. 209).

In my opinion, such a system, in spite of its likely effectiveness, does not have realistic chances to become a reality, save in the case of very intense public pressure (which is made unlikely by the undeniable success of the efforts of climate change deniers). Moreover, according to Hansen (2009), "the difficult part is that we must make the transition *with extraordinary speed* [italics added] if we are to avert climate disaster" (p. 209).

The fourth and last inference regarding the probable temperature increase of the planet (see Figure 2) has been drawn from an examination of the yearly

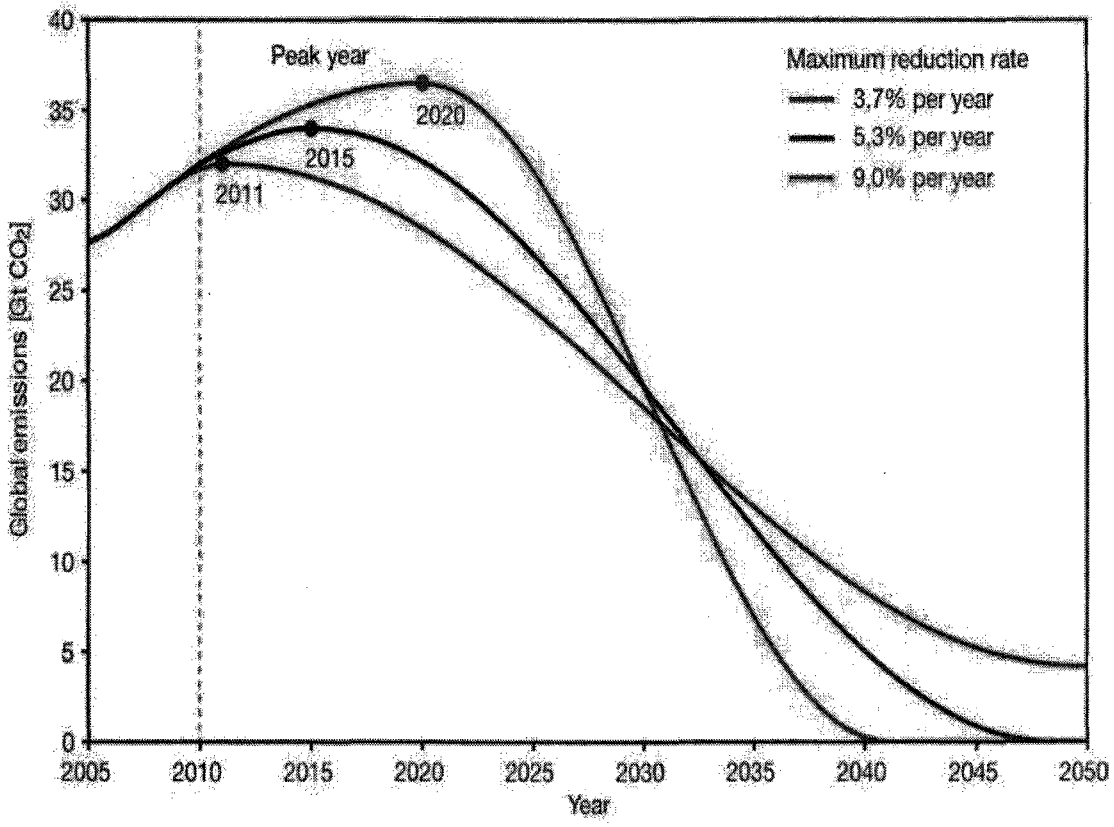

Figure 2. The critical decade: Global emission trajectories for 2°C guardrail.[20]

Note. From the seminar *Climate change 2011: Risks and responses for Australia's cities and regions*, by W. Steffen, 2011, University of Canberra, Canberra, Australia. Reprinted with permission of the author.

percentages of emissions reductions after the emissions peak and the impact of these percentages on our infrastructure. The quantity of carbon dioxide already in the atmosphere and the fact that the emissions are on an ascending path make the emission reduction curves (to keep our chances of avoiding a temperature rise higher than 2 degrees) very sensitive to the year the emissions will peak. The peak will not arrive in the year 2011—but if this were to happen, the subsequent reduction percentage would be of 3.7% yearly and a low level of emissions could still be acceptable past 2050.

The yearly reduction rate increases to 5.3% if the emissions peak would be attained in 2015. I do not see how this can happen, since there are no technologies that could replace fossil fuels as the main energy source in such a short period of time; a similar reasoning raises doubt whether or not the emissions could peak in 2020. A peak in 2015 requires the emissions to be reduced to zero by 2047, and a peak in 2020 requires them to be zero by 2041, with a yearly reduction rate of 9.0%.

According to Steffen (2011), a yearly reduction rate of 9% would be very challenging for our industrial infrastructure. This is consistent with the assessment indicating that "to have any hope of preventing major climate catastrophes, the world needs to undertake a massive, coordinated, and planned transformation of the entire economic infrastructure" (Li, 2010, p. 303). Moreover, it is questionable if nuclear energy from fourth generation reactors or from thorium salts reactors would be available by 2020. The most optimistic forecast that I found in the literature regarding the availability of fourth generation nuclear reactors is made by Hansen (2009):

> It is *conceivable* [italics added] that next-generation nuclear power might begin to be broadly deployed in China or India as early as the 2020s. Deployment

would be soonest if the United States would cooperate with these nations and treat this as a matter of urgency. (p. 204)

If we consider this citation in the context of Steffen's (2011) graphs in Figure 2, we could say it is *conceivable* we may just barely have the time to switch to postcarbon technologies *if* we act immediately. Before the new technologies are commercially available, the public should be educated with regard to the energy and safety advantages they offer. Such a process should be already under way to have time to deal with negative public reactions or with legal challenges from special interest groups. I have not taken into account the lengthy political negotiations needed to bring such sweeping changes to the global energy supply; and, given the past track record of the fossil fuels industry, they will not allow these changes to happen without fighting.

I will present the inferences drawn from these four sources in Table 2. In summary, the analysis indicates that the average temperature increase by the end of the century will exceed 2°C. It therefore becomes relevant to examine what implications an eventual increase of 3°C could have on humanity. What would a 3°C world look like? Would the current social and economic institutions be able to cope with the conditions generated by this new climate? What can individuals and communities do to increase their chances of adaptation and survival?

In the 3°C scenario, Australia will be affected by severe water shortages, which will affect food production and may oblige many people to move out of the affected areas (Lynas, 2007, pp. 134–135). Many coral reefs will disappear, together with 30% to 50% of all animal species alive today, with consequences that cannot be anticipated (Lynas, pp. 168–169). Such a temperature increase, combined with changed rain

Table 2

Future Temperature Increases Inferred From the Analysis.

Source	**Anticipated increase**	**Comments**
Lynas (2007)	More than 2°C	After 2°C the carbon cycle feedback will reduce the capacity of land and the oceans to absorb carbon dioxide. For this reason it is hard to anticipate at what temperature the climate will stabilize again.
IPCC (2007)	3.4°C	Following the A2 development scenario. Some recent observations (Steffen, 2011) indicate the IPCC AR4 estimates were conservative.
Hansen (2009)	More than 2°C	Hansen's proposals will most likely not materialize, considering the urgency of introducing the changes and the strength of the interests that oppose them.
Steffen (2011)	More than 2°C	The capacity of our infrastructure to adapt to the changes required by the emission reductions will be seriously challenged if we peak after 2020.

patterns, will lead to crop failures, famine, and massive population migration (Lynas, pp. 170–172). As anticipated by the UK's Met Office Hadley Centre, a 3°C warming would bring the death and desertification of the Amazon region and the subsequent loss of 10% of the photosynthetic output of the planet. Although the possibility of this mass disaster has been known since 2000, there has been little reaction in politic circles or in the media (Lynas, pp. 125–126).

The Amazon would be only one of many regions affected by a 3°C warming; the weather in Europe will change significantly, droughts *and* floods will become more frequent, and some areas such as the south of Spain and Portugal will be affected by desertification (Lynas, 2007, pp. 160–163). These weather changes do not take into account the significant cooling that is likely to occur in Europe if the Gulf Stream slows down or stops due to changes in the temperature and salinity of the Arctic Ocean. If the temperature rises by 3°C, 80% of the Arctic sea ice will be lost, and many glaciers will melt in Greenland and Iceland. The melting of these glaciers could lead to a rise of the sea levels by a quarter of a metre (Lynas, pp. 140–142). With rising sea levels and more frequent storms, highly populated areas such as New York will experience frequent floods (Lynas, pp. 158–159.)

Several African countries, such as Zambia, Angola, Namibia, and Botswana, will be severely affected by desertification. The changed climate will also make African people more susceptible to be infected with vector-borne diseases such as malaria and dengue fever (Lynas, 2007, pp. 164–165). Water scarcity will lead to drought not only in Africa; in the Western United States, many forests will be affected by drought, pest attacks, and massive fires (Lynas, pp. 154–157). In the same time, the

frequency and intensity of storms and hurricanes will increase, affecting many coastal cities (Lynas, pp. 138–139). The warmer climate will also lead to the disappearance of the Himalayan glaciers, which will severely affect the water supply for countries like Pakistan, India, and China (Lynas, p. 151–153). The potential of localized or more extended conflict is very significant, since this is one of the most populous areas of the world, and all these three countries have nuclear weapons.

Homer-Dixon mentions that during their evolutionary history, humans have often lived in conditions of extreme climatic variability (2001, pp. 198–199). This enables them to respond much better to clear and present danger than to slow, incremental changes. The global warming phenomenon is still perceived as a vague future threat, and there is a serious chance that the warnings of the scientific community will fall on deaf ears, while our political leaders and a majority of the population continues to be trapped in "a mutually gratifying and self-sustaining cycle of denial and delusion" (Homer-Dixon, 2008, p. 219). But in a few decades, the effects of climate change will likely be obvious to all, and then, the public will probably rally and demand action against them. At that time, only reducing carbon emissions is not likely to bring much relief, since we will probably be on a path toward a 3–4°C increase in global temperatures. The only viable option left at that time would probably be to apply geoengineering schemes in order to reduce the temperature of the planet. Provided we have not been confronted with widespread societal collapse and there is still enough energy to sustain such technological interventions, this option will probably be adopted (Bicks, 2009).

Such interventions are advocated by some, in case the society is unwilling or unable to reduce emissions (Ward, 2009, p. 149). Several geoengineering ideas are also presented by Lovelock, in order to mitigate what he calls global *heating*. However, he cautions they should be used only as temporary solutions in order to allow us to gain more time (2009, pp. 92–104). We should not forget this would be an engineering feat of an enormous scale, in which we would be dealing with many unknown unknowns; it is something we have never tried before, and, if we start it, it is probably something we will have to keep doing forever. Given a choice, how many of us would want to embark on such an undertaking?

Conclusion

Human activity has extremely serious consequences on the well-being of nature. The global cycles of several elements is disturbed, resources are being exhausted, the rate of species extinction has increased more than a hundredfold, complex ecosystems are converted to cropland, the oceans get warmer and more acidic, the Arctic ice and the Himalayan glaciers will likely disappear in a few decades, and human-induced climate change due to greenhouse gas emissions threatens to bring an increase of 2°C or more in the average temperature of the planet. This may start a chain of positive feedback loops that could make the climate switch abruptly to a much hotter state. It is very questionable whether our civilization could survive in such circumstances.

To express this conclusion in succinct terms, we seem unable (save for a sudden and unexpected positive turn of events) to prevent a temperature increase of 2°C or more. At the same time there is significant scientific evidence showing that

beyond this 2°C threshold our climate will enter a dangerous and irreversible path toward a hotter state, and it is hard to anticipate at what temperature the climate will stabilize again.

If decisive action would be taken immediately at a global scale, it would still be possible to mitigate the worst effects of climate change and do it for a reasonable cost (Stern, 2009). However, if we postpone action and continue to focus on the economy, it is likely that toward the second part of this century we will be faced with multiple challenges: an impoverished biosphere, inability to sustain human subsistence; infrastructure damage due to extreme weather events and massive relocations due to rising sea levels; unreliable food supply due to changes in rainfall patterns, rising temperatures, as well as to increased droughts and floods; and resource shortages leading to severe hardships for many people and possibly to violence and armed conflicts. Dealing with all these challenges at the same time will be extremely difficult, even for the Western world, and the widespread collapse of our civilization cannot be excluded.

CHAPTER FOUR: THE MYTH OF THE ROMAN EMPIRE

"Long live the fight for peace!"—said a Communist slogan back in the 1950s. The oxymoron was laughable, but the Communist leaders were taking their policies seriously. At that time, the Cold War was at the beginning, and they were trying to convince the populations of their countries that the blame for it laid exclusively with the "imperialist policies" of the West. This was a lie—the Communists were much to blame themselves for the increased international tension and the dangers it entailed (Judt, 2005, p. 126). At the same time, they wanted to present their regimes as the outposts of a new world order, guaranteeing happiness and peace for all, and for this reason they could not admit to pursuing aggressive policies. However, living up to what they preached was hard, so they adopted an easier solution: to continue being aggressive toward the West, while at the same time pretending they were doing it . . . for peace (Pleşu, 2010).

I find that a similar split can be observed today between the environmental declarations and the actual policies of many countries. We continue, politicians and citizens alike, to focus on economic growth, while pretending we do it for "a greener tomorrow." Like a "junkie, we keep telling ourselves it's time to come clean, without ever actually doing it" (Goodell, 2006, p. XIII). While the Communists could get away with their ridiculous declarations by crushing any dissent, contemporary political leaders do it by taking advantage of the confused and conflicting priorities of their populations:

> A 2008 survey by the *Globe and Mail* found that while 79 percent of respondents said the tar sands are good for Alberta and Canada, more than half

> of those respondents (55 percent) said that the sands were not good for the environment. The obvious contradiction can be justified only by minimizing or disconnecting oneself from the importance of Earth's ecosystems. (Marsden, 2009, p. 173)

In my understanding, the statement "good for Alberta and Canada" is based on economic and political considerations, so I see the above passage as reflecting not only a disconnect between humans and the ecosystems of the planet but also a disconnect between our economic and political priorities on one side and our environmental priorities on the other.

In this chapter I examine these two kinds of diverging priorities and their likely tendencies; ideally, they should converge and contribute to defining our future, but I see almost no evidence of this happening yet. Further I will discuss some important criticisms that target the main arguments of my thesis; and I will finish the chapter by analyzing some of the cultural traditions that in my opinion keep the Western society locked in an unsustainable pattern of growth.

In order to adequately deal with the criticisms, I will now introduce John Dewey's pattern of inquiry, which, I will argue, offers us a powerful conceptual tool for dealing with the challenges ahead. Inquiry is defined by Dewey as follows: "*Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole*" (1938/1986, p. 108). Dewey elaborates his definition of inquiry under six headings: the indeterminate situation; institution of a problem; the determination of a problem-solution; reasoning; the

operational character of facts-meanings; and common sense and scientific inquiry (pp. 109–120). At this stage I will present the pattern of inquiry only briefly; it will be discussed more in detail in Chapter Five in the context of analyzing the current climate crisis and its possible solutions.

A feeling of discomfort, doubtfulness, unsettledness precedes and initiates the process of inquiry. This "indeterminate situation" presents "nothing intellectual or cognitive," although it is "the necessary condition of cognitive operations or inquiry" (Dewey, 1938/1986, p. 111). In a succinct formulation, a person (about to become an inquirer) becomes aware that something is amiss. The process of inquiry is initiated by this feeling, which is a characteristic of the situation the person is faced with: "It is the *situation* that has these traits. *We* are doubtful because the situation is inherently doubtful" (Dewey, p. 109). The start of the process of inquiry is marked by the definition of this doubtfulness in terms of a problem: "The first result of evocation of inquiry is that the situation is taken, adjudged, to be problematic" (Dewey, p. 111). The "institution of a problem" (p. 111) marks the beginning of an interaction of conceptual and observational factors that will lead gradually to the formulation of solutions.

To be able to correctly define a problem means "to be well along in inquiry," to realize that "the problem instituted has, in the very terms of its statement, reference to a possible solution" (Dewey, 1938/1986, p. 112). Such a possible solution links further the conceptual and observational elements: "The possible solution presents itself, therefore, as an *idea*, just as the terms of the problem (which are facts) are instituted by

observation" (Dewey, p. 113). This gradual process is defined as "the determination of a problem-solution" (Dewey, p. 112).

A possible solution should not be accepted immediately; it should be examined together with other possible solutions to determine which one is more suitable to resolve the given situation. We can use reasoning to develop "the meaning-contents *of ideas in their relations to one another* [italics added]"; in this process, "through a series of intermediate meanings, a meaning is finally reached which is more clearly *relevant* to the problem in hand than the originally suggested idea" (Dewey, 1938/1986, p. 115). An idea developed in such manner is very well suited to direct further operations of observation and rearrangement of the observed facts, which will lead to a further refinement of ideas, and so on: "The new order of facts suggests a modified idea (or hypothesis) which occasions new observations whose result again determines a new order of facts, and so on until the existing order is both unified and complete" (Dewey, p. 117).

This brief review of the pattern of inquiry will help the understanding of the arguments I will present when responding to the criticisms of Bowers (1993) and Russell (1939/1951, 2005). The pattern of inquiry will be analyzed in detail in Chapter Five. I will now return to the examination of the economic, political, and environmental tendencies mentioned earlier in this introduction.

Economic and Political Tendencies

I will argue below that our sophisticated and interconnected network of institutions that ensure the proper functioning of our socioeconomic system may be very severely affected by the shocks of climate change, resource depletion, and the

economic and social upheaval that are likely to happen later this century. The reasons for this argument are the following: Our economy is profoundly dependent on carbon-emitting fossil fuels, and we lack definite plans to *significantly* reduce our energy consumption and switch to cleaner sources of energy; this exposes us to severe risks associated both with climate change and the depletion of oil. Our economic and political lives are dominated by what I would call an assault of the private sphere against the public sphere, which has already gathered critical mass and has neither intrinsic nor extrinsic reasons for relenting; and our environmental initiatives fail to capture the hearts and minds of the larger public.

This perspective seems quite pessimistic but is not necessarily so. The only problem that I consider essential here is one of *transition*. First, we would need to prevent extremists from taking hold of an unstable situation and exploiting it for their own purposes. I think Homer-Dixon (2008) is right in saying that in moments of critical choice "the worst personalities and passions too often prevail" (p. 280); we will need to prepare for and counter such tendencies. Then, if our civilization is to survive and flourish, our descendants a few generations from now will need to live according to principles that are very different from ours. How are they going to develop those principles? This question probably cannot receive a unique answer applicable everywhere in the world, but I think people could be successful working collectively within smaller communities with the purpose of making their respective communities more resilient. If enough communities around the world build their strength in this way, and if the collapse of our current system is not going to be extremely brutal, the coming crisis may be an opportunity for renewal.

I think that the chances of success are bigger if we initiate change within smaller communities, because efforts that are strictly individual cannot succeed considering the enormity of the challenges we are likely to face. At the other end of the spectrum, global changes are desirable; they, *if implemented*, would be highly effective, but that would require a new set of rules (and institutions) to be in place worldwide by 2020 (Stern, 2009, pp. 201–202). I do not think this can be achieved, especially if we consider that such efforts will run "headlong into a wall of opposition from industries, politicians, and consumers with vested interests in the status quo" (Homer-Dixon, 2008, p. 267).

In Chapter Five I will discuss how I plan to approach the task of promoting environmental education within smaller communities, using the framework of John Dewey's pattern of inquiry. In order to build their resilience, communities will most likely need to adopt what Homer-Dixon has termed a prospective mind: "We need to be comfortable with constant change, radical surprise, or even breakdown, because these are now inevitable features of our world, and we must constantly anticipate a wide variety of futures" (Homer-Dixon, 2008, p. 268).

During the first hundred years of the history of the United States, corporations could not exist unless they were able to balance the public and private good in their activity. The ones that failed on this criterion were shut down by state authorities and their assets were sold. Companies were forbidden from owning other companies. Their existence was limited in time: "Corporations couldn't exist for more than twenty to forty years (depending on the state) and could perform only one single function or make a single type of product" (Hartmann, 2009, p. 153). While some of these

restrictions are unreasonable, they reflect a preoccupation of past legislators to limit the powers of corporations and prevent the appearance of a ruling class that would threaten the social fabric of the country. Corporations were also forbidden (at least in Wisconsin, according to a 1905 law, struck down in 1950), under heavy penalties (corporations were to be dissolved and their representatives fined and/or imprisoned), to make any sort of political contribution, attempt to influence legislation, "or to promote or defeat the candidacy of *any* person for nomination, appointment or election to *any* political office" (Hartmann, p. 197). Here, the intention of the legislators was to prevent collusion between company owners and political leaders.

These laws were struck down long ago; corporations now have all but unlimited power, and they use it to make more and more profits. One of the mechanisms for achieving this is called "externalizing," that is, privatizing the benefits while socializing the costs (Barber, 2007, p. 149). Several examples can be given: companies which make products that affect the health of consumers and keep their profits while socializing the suffering and health care costs; companies who destroy or pollute the environment while passing the cleanup bill to the taxpayer (Goodell, 2006, p. 72); the financial bailout that followed the 2008 crisis in the banking sector; the severe austerity measures that are now affecting countless people all over the world following years of reckless borrowing that enriched a small number of speculators.

This is not implying that corporations are essentially *bad*, but that the legislation that currently governs them is deficient. The overarching goal of any corporation is to make money, and that goal is now achieved "without regard to human life, the social good, or the impact of the corporation's activities on the environment.

Corporation bylaws impose a legal duty on corporate executives to make the largest profits possible for shareholders" (Hedges, 2009, p. 162); for the performance of this duty the executives are often rewarded with enormous amounts of money and with other advantages. It has been argued that such rewards (in excess of $1 billion per year for some executives) represent "sociopathic paycheques," paid to the few people who can "daily make decisions that destroy the lives of many other human beings" (Hartmann, 2009, p. 95). If this appears like an overstatement, one needs to consider the millions of American jobs that have been outsourced overseas, with devastating effects on American people and communities. Some could argue that other lives have been helped, and that goods are made less expensively. On the one hand, such help is transient—corporations have no loyalty to the communities that provide their workforce, and as soon as a cheaper workforce becomes available elsewhere, they will not hesitate to relocate their operations. On the other hand, making goods less expensively will be a stimulus to produce more of them, without considering the detrimental effects this has on the environment.

The above discussion regarding corporations, executives, and sociopathic behaviour may still seem far-fetched, but, for example, in the 1990s many transnational corporations such as Exxon, General Electric, Chevron, Mitsubishi, IBM, Kodak, Pfizer, Sears, and BASF were found guilty of various *criminal* offenses and fined (Achbar & Simpson, 2003). Corporate crime is also frequent in the financial sector: In 2002, following the burst of the Internet Bubble, the following banks have agreed to pay a total settlement of $1.4 billion in order to avoid criminal prosecution: Bear Stearns, Credit Suisse, Deutsche Bank, J. P. Morgan, Lehman Brothers, Merrill

Lynch, Morgan Stanley, UBS, Goldman Sachs, and Citigroup (Ferguson, 2010). Moreover, Credit Suisse was found guilty of laundering money for Iran in violation of U.S. sanctions and fined $536 million; Freddie Mac was found guilty of accounting fraud and fined $125 million; Fannie Mae was found guilty of accounting fraud and fined $400 million (Ferguson).

On a more sinister note, the founding CEO of IBM, Thomas J. Watson Sr., met in person with Adolf Hitler as late as July 1937 and was apparently aware that the technology supplied by his company was going to be used for concentration camp management (Achbar & Simpson, 2003); in that situation, profit considerations obviously prevailed over ethical ones. As a side note, individuals suffering from antisocial personality disorder make up as much as 50% of the U.S. prison population (Health Canada, 2002, p. 9). I want to emphasize again that in my view the callous disregard that corporations sometimes display for the well-being of others does not come from an essential *badness* of corporations or executives but from faulty legislation and oversight.

In the United States people who were already very rich have enriched themselves further in the last few decades: Between 1980 and 2004, the wealth of "14,000 taxpayers that make up the highest 0.01 percent" grew over 440%, an average of 18.3% per year every year (Paskal, 2010, p. 55); this was accompanied by a significant impoverishment of the working class (Hedges, 2009, p. 164) and a decline of the middle class, with potentially serious social consequences (Homer-Dixon, 2008, p. 257).

Today, according to a World Bank economist, 16% of people are rich, 77% poor and only 7% belong to the middle class (Homer-Dixon, 2008, p. 257). Besides the potential social risks, both extreme poverty and huge wealth can destroy the understanding that one has of the world (Beavan, 2009, p. 214). I think that the rich and powerful would have a vested interest in preserving a world that gives them so many privileges, but they are surprisingly short-sighted in pursuing this goal. The capitalist system has worked to their advantage for a long time, but, as it is currently organized, is deeply unsustainable.

A critique of capitalism and the systemic issues related to the corporatist structure that underlie it would probably be more meaningful than limiting the discussion to faulty legislation and lack of oversight (D. Hutchison, personal communication, August 27, 2011). Indeed, it has been argued that due to systemic issues the capitalist system has arrived at a "significant historical turning point" (Li, 2010, p. 290) and needs to be fundamentally redefined. However, while the crisis is largely acknowledged, the future alternatives are very uncertain (Li, pp. 298–300); for this reason I will not embark on such an analysis.

The market ideology tends to eliminate all other alternative paradigms and dominate our lives through being ubiquitous, omnipresent, addictive, self-replicating, and "omnilegitimate (it engages in active self-rationalization and self-justification, eroding the moral bases for resisting it)" (Barber, 2007, p. 222). Indeed, such forms of self-rationalization and self-justification can often be seen in the arguments of those who oppose much-needed changes because they "would hurt the economy." From a moral point of view, their arguments are just as invalid as those advanced by the

defenders of slavery 150 years ago. On matters such as slavery, or, even more, the future existence of human civilization, "you start with, 'Is it right or wrong?' Then you act on that judgment. You don't say, 'I'm not going to say it's wrong because it would be too impractical to undo'" (Frazier, as cited in Goodell, 2006, p. 254).[21]

It may be argued that bringing extensive changes to our economy would have a higher cost than maintaining the status quo. Indeed, we would "need to revamp everything from our cars to our methods of making concrete and growing rice" (Homer-Dixon, 2008, p. 267), and the costs would be most likely high. However, they can be considered modest if we take into account the catastrophic consequences that are likely to follow if nothing is done regarding the climate change crisis (Stern, 2009, p. 32).

Far from being omnipotent and omniscient as portrayed by some, markets depend on laws and stable governments in order to function properly and are notoriously unable to take into account the multifaceted benefits offered by nature. They are also unable to capture the true societal cost (present and future) of producing energy from dirty sources or making goods that increase pollution; these are all important and obvious market failures. The cutthroat trading transactions that characterize many market activities today depend heavily on the latest technology, on taking complex decisions in a matter of seconds, and they are not always generating profits (Homer-Dixon, 2001, pp. 24–25). Economic optimists attempt to support their theories by extrapolating the present trends linearly, using highly aggregated statistics and downplaying facts that question their point of view (Homer-Dixon, pp. 31–33). I think that believing in the omnipotence of the markets is largely an illusion; but at the

same time it is also one of the main articulations of a complex mechanism that keeps the world attuned to the drumbeat of corporations and their profits while disregarding viable alternatives to this model.

While the renewable energy industries struggle for their market share, fossil fuel companies use their enormous influence to maintain their dominant position, delay conservation efforts, and sow doubts about the causes of climate change; as a result, "44 percent of Americans believe global warming comes from 'long-term planetary trends'" and not from the use of fossil fuels (McKibben, 2010, p. 55). The oil, gas, and military industries are staunchly (although not openly) opposed to any real reform in terms of energy alternatives, because such a reform will destroy their profits. Reducing our dependence on fossil fuels "would wipe out tens of billions of dollars in weapons contracts. It would cripple the financial health of a host of private contractors from Haliburton to Blackwater/Xe. . . . This is the harsh, unspoken reality of corporate power" (Hedges, 2009, p. 152). Given the enormous sway of these corporate interests, I do not think that significant changes in our energy consumption habits are to be expected soon.

The net result of these tendencies is that we remain stuck in our current way of living, in spite of its quite obvious failures, as well as our potential ability to avoid the most serious consequences of climate change and resource depletion if we do not delay action. The biggest obstacles for ingenuity are *not* raised by a lack of ideas but by powerful interest groups that prevent reform (Homer-Dixon, 2001, p. 23). These groups have vested interests in maintaining the status quo and use their influence to

"block or divert policies that genuinely address the problems' underlying causes" (Homer-Dixon, 2008, p. 267).

This "blockage of ingenuity" is made much worse by the urgency to act: The result of our efforts in dealing with climate change depends largely on our actions during the next *decade* (Steffen, 2011). Moreover, in spite of its enormous potential impact, climate change is not the only issue that we need to tackle. There is an array of other important and urgent issues that need to be addressed at the same time, such as controlling human fertility rates, conserving ecosystems and biodiversity, reducing poverty, disease, and violence, and preventing terrorist acts (Homer-Dixon, 2008, p. 282). There is however no evidence that the world has enough political will to be able to respond to such unprecedented challenges (Stern, 2009, p. 204). Being able to change course soon is also not realistic, because a majority of the population would not support the drastic measures that would need to be taken:

> Everyone has to *keep* [italics added] voting for politicians who will raise the price of gasoline high enough to cause most of us to park our cars and take the bus. For that to happen, we'd need to build a movement more powerful than the energy industry, powerful enough to raise the price of coal to the point where energy companies will simply swallow their investments and start shutting the plants down. (McKibben, 2010, p. 56)

This passage contains several questionable points. One cannot even *start* to vote for politicians who would rise the price of gasoline so high, for the simple reason that no such politicians exist (not to my knowledge, and if they do exist, it is very easy to discredit them as eccentric fringe thinkers or anarchists). Also, to "build a

movement more powerful than the energy industry" does not seem realistic to me—such a movement would face immense hardship from the energy industry and would need to find its membership among people who are not driving cars, or otherwise convince them to fight against their immediate interests. And I cannot see companies accepting to "swallow their investments and start shutting the plants down" in any circumstances that still maintain a remnant of economic stability. I believe that the vision expressed above by McKibben (2010) suffers from what I would call an "environmental bias." More fundamentally, I argue that it suffers from an "either–or" bias; I think that a fight between environmentalists on one side and big business and politicians on the other cannot have any winners.

The connections between money and political power have existed for a long time and continue to exist today (Rothkopf, 2008, pp. 152–153). I think in the current situation their main detrimental effect comes from a convergence of political and economic power in very few hands and a weakening of democracy (these tendencies also reinforce each other). A very powerful but self-referential elite and a disillusioned electorate, interested more in entertainment than in politics (Rothkopf, p. 147), leave almost nobody in between who could question the habits (let alone values) of our society and estimate where they are likely to lead us. Materialism, consumerism, television, and entertainment are ubiquitous in our society, and they are strongly associated with poor environmental values (Good, 2007, pp. 369–370).

At the end of this section I need to mention that in spite of the above criticisms, not all businesses are bad corporate and environmental citizens. One outstanding exception is the corporation *Interface*, which has been mentioned already and whose

example will be discussed more in detail below. However, such companies fail to influence the larger corporate climate and remain isolated exceptions.

It is misleading for people living in developed countries to think they will not be affected by the upcoming changes, and our societies should prepare adequately (Paskal, 2010, p. 248). Unfortunately this is not happening, and consequently the risk of widespread failure affecting at the same time our environment, resource base, and our economic, political, and social systems is growing. Such an event has been called *synchronous failure* and it would be "destructive—not creative—catastrophe" (Homer-Dixon, 2008, p. 16).

It would make sense to change the habits that define our lifestyle, sooner rather than later, but unfortunately people rarely heed warnings; they need things to change in radical ways before they react (Homer-Dixon, 2008, pp. 268–269). It is interesting to examine our current economic and political tendencies in the perspective of Diamond's (2005) research on the factors that determine the survival or failure of societies faced with significant hardships. Diamond has identified four major factors that are present in most societal crises and have a significant influence on their outcomes. These factors are the following: environmental damage, climate change, trade partners, and neighbours (pp. 11–15). The favourableness or unfavourableness of natural conditions and the friendliness or hostility of human societies have a large influence on the end result of each crisis; however, these four factors cannot always predict a favourable or unfavourable outcome.

According to Diamond (2005) there is another factor that is always a reliable predictor of success or failure: the *response* of the society to the problems with which

it is faced. In our case, as we shall see, it seems to indicate failure. Diamond defines societal response by two main characteristics which he considers crucial in determining the outcome of a crisis: long-term planning and the willingness to reconsider core values (p. 522). I will analyze each characteristic separately, and I will limit the discussion to arguments pertaining to climate change.

I argue that we have no adequate long-term planning. We know that oil reserves have started to dwindle, yet we do not take any measures to reduce consumption substantially and switch to cleaner sources of energy. The only source of energy that could offer plentiful supply at the present time, without the carbon dioxide pollution, is nuclear fission; building a nuclear facility takes years, and years more are needed to obtain the necessary approvals before starting. Not much is being done to overcome the concerns many people have with regard to the dangers of nuclear energy (this situation was recently made worse by the nuclear accidents that happened in Japan in March 2011), so the opportunity to use nuclear energy on a scale large enough to be able to sustain our civilization is being missed. Other forms of "green" energy, as it will be shown below, cannot support us due to low efficiency and reliability. This leaves us with only one viable alternative—coal—which will be able to power our civilization for a while but in turn will worsen the climate change crisis. This is probably a terrible choice, but I fail to find evidence that we are preparing for anything else.

The other element that Diamond (2005) considers important is the ability of a society to question its core values. This is consistent with John Dewey's thinking: "When problems are new, old responses may not work. In those cases, it becomes

advantageous to *inhibit* pre-organized responses . . . to prevent an automatic response" (Hildebrand, 2008, p. 29). I think our core values (shared and actively promoted by a majority of people) have been for a long time affected by a carefully cultivated individualism, and now they are further transformed, very rapidly, by a technological revolution that will be discussed in detail below; I think in this context it would be more appropriate to talk about our societal habits. As it has been argued above, we seem by and large unable to change these habits.

If we agree with Diamond's (2005) arguments, then it seems likely that our society is heading—hopefully not toward total collapse—but toward a serious setback and readjustment later this century. This is not necessarily meaning the overall long-term outcome will be bad; there will be undoubtedly great hardships, but at the same time many of our existing paradigms have to fail because otherwise new paradigms cannot appear and flourish. There is however the possibility that the crash of our current system will be sudden and complete, and in this case the survival of our civilization becomes very questionable.

Many of the trends that we observe in our society had been already decried by John Dewey several decades ago: Dewey thought that "unrest, impatience, irritation and hurry" were affecting the lives of many people, who were showing a "feverish love of anything as long as it is a change which is distracting, impatience, unsettlement, nervous discontentment, and desire for excitement" (as cited in Hildebrand, 2008, p. 108). Their lives were overwhelmed by "economic goals in a civilization that Dewey calls 'outwardly corporate', where 'our prevailing mentality, our ideology, is . . . that of the 'business mind' [whose] . . . prevailing standards of

value [are] . . . derived from pecuniary success and economic prosperity" (Hildebrand, pp. 108–109). In such a climate, individuals lose their points of reference and become insecure and disoriented; having "become appendages to business technologies, their individuality is made both less stable and less meaningful" (Hildebrand, pp. 109–110).

John Dewey has asked if "a material, industrial civilization can be converted into a distinctive agency for liberating the minds and refining the emotions of *all* [italics added] who take part in it?" (as cited in Hildebrand, 2008, p. 112). I think that in the light of the above arguments the answer to this question is, unfortunately, *no*. Many of the tendencies decried by John Dewey have worsened significantly since his time; moreover, the primary purpose of a "material, industrial civilization" is to generate artefacts and wealth. This our society does, but unfortunately, to the exclusion of many other important goals. We need to change our way of living in order to deal with the coming crises, and this can be done only through reflection and creativity. These are uniquely human abilities, and from this point of view the opportunity is exciting.

Environmental Tendencies

A Google search on a term such as "environmental events 2011" will yield a very large number of results; I ran this search in March 2011, and after analyzing the first 200 results (the most relevant are displayed first) I found that a majority of the events listed could be grouped in one of two very different streams: The first stream focuses on the business opportunities fuelled by the increased awareness of the public and governments with regard to environmental and sustainability issues, while the

second focuses on the possible consequences of climate change and how to deal with them most effectively.

For illustration purposes, I will give the examples of two conferences held in March 2011, both co-ordinated by credible organizations, one from each stream—business opportunities and consequences of climate change, respectively. The "business opportunities" conference was called "Managing carbon to benefit your bottom line: Innovative tools and approaches to carbon management" and was advertised as follows: "Join forward-looking leaders from government and business for a discussion of practical and innovative ways to prepare for and take advantage of a clean energy economy" (The Climate Registry, Environ, & NSF International, 2011). Somebody who never followed an environmental debate before and happened to read the poster of this conference would be most likely influenced by the perspective taken by the organizers: The economy needs to be powered by cleaner energy, and this offers opportunities to make money. This is an important perspective, but, as I will argue below, it is not sufficient to help us prepare for the future.

The main goal of any business is to make money, and if carbon management or clean energy can serve this purpose, then business people will be interested to listen. Seeing things through this perspective explains in part the slow progress of sustainability ideas—there is not enough money to be made, because of the incipient stage of carbon trading and the inherent limitations of alternative energy technologies and products. Obtaining energy from sources such as wind, solar, or geothermal "looks green" more than it really is. Solar panels function best in full sunlight, wind turbines need steady wind, neither too strong nor too weak, and geothermal energy ideally

requires that the earth is hot close to the surface. All these alternative forms of energy have a low energy return on investment (EROI), calculated "by dividing the amount of energy a project produces by the amount it consumes" (Homer-Dixon, 2008, p. 51).

In spite of significant efforts intended to make the business community more receptive to a sustainability approach, progress is slow. The percentage of companies that have taken significant steps to become sustainable may be "as *high* [italics added] as 10%," but this is not a reliable figure because "most of them would be small companies privately owned, so it is hard to get a good count" (B. Willard, personal communication, March 23, 2011). Companies that would take a "green turn" could theoretically obtain business advantages such as: hiring and retention benefits due to a sustainable image; increased employee productivity; reduced expenses in manufacturing and commercial operations; increased revenue and market share due to customers attracted by the improved corporate image; and easier financing (Willard, 2008, p. 21). Any company, regardless of its domain of activity, could capitalize on such business advantages. However, these potential advantages must also have drawbacks, or otherwise all corporations would want to "jump in the green bandwagon." Hiring and retention policies have to consider other important factors such as wages and career opportunities; the reduced expenses come only after investing in energy reduction, conservation, and waste reduction measures; and revenues, market share, and financing are highly sensitive to prices, competition, and the overall economic climate.

Allowing corporations (implicitly, through the functioning of our economic system) to decide on whether, when, and how our civilization will switch to cleaner

energy is mistaken, because it introduces an extraneous economic variable in the decision-making process. Willing or not, in a not-too-distant future, we will have to switch from "high-EROI to low-EROI sources of energy" (Homer-Dixon, 2008, p. 250). It will be interesting to see *who* is going to lead that change. It is not going to be led by the business community, and also not by "sustainability champions" who cater to the needs of the business community:

> Sustainability champions should not push sustainability, per se. *They should solve business problems* [italics added]. If they talk about sustainability rather than [economic] issues . . . executives may hear them talking about "fried dead bird" instead of "finger-licking-good chicken." They need to help executives tune into WII-FM (What's In It – For Me?), instead of WII-FW (What's In It – For the World?; Willard, 2005, p. 23)

The effort of helping executives tune into WII-FM instead of WII-FW is probably better spent elsewhere—this is the executive mindset already. My discontent is not aimed at sustainability initiatives (I sincerely admire the efforts deployed by Willard, among many others) but at the counterproductive approach of submitting such initiatives to the approval of business leaders whose priorities are essentially different:

> They [sustainability champions] need to channel their passion and commitment to sustainability and focus on how sustainability strategies get traction in the boardroom as an irresistible means to achieve executives' already existing goals. Sustainability champions' ends need to be reframed as executives' means. (Willard, 2005, p. 23)

How is the process described above supposed to work? Assuming that "goals" and "ends" are equivalent, it appears that sustainability strategies should become the means that executives use in order to achieve *their* goals. The subordination of sustainability concerns to business concerns is made obvious here, so I venture to say that if the sustainability strategies are not going to be appropriate, let alone "irresistible" as means to achieving the goals of the executives, they are simply going to be put on the side. I think it is *wrong* to subordinate the very worthwhile goal of switching the economy to cleaner energy to business considerations, although it has been argued this approach is the only practical one (Diamond, 2005, p. 17). "But how is it ever going to happen otherwise?" could a critic immediately ask. I am aware of such an objection, and I know it is important. Eventual answers to it could come as a result of the inquiry process that is the subject of the following chapter.

According to Homer-Dixon (2008), the change from high-EROI to low-EROI sources of energy is not going to be led by our society leaders, either: "Very few people – certainly not our society's leaders – grasp the significance of this change, yet it's of epochal importance. It marks the beginning of a shift from our modern industrial civilization to *some other kind of civilization* [italics added]" (p. 250). As I have argued already, political and business interests are closely interconnected in our world, so I find the statement of Homer-Dixon accurate. Moreover, the statement also reflects the fact that we know a change needs to happen, but we are yet unable to define it.

The second conference that I am going to use as an example was focused on the consequences of climate change; it was called "Imagining the worst: Foresight, ethics, and extreme climate scenarios" (UNESCO & ASO Ljubljana, 2011). To use the

same analogy, somebody who never followed an environmental debate before and happened to read the poster of this conference would likely be influenced to believe that climate change is the most important and urgent issue that we need to concentrate on. This is also an important perspective, but I will argue that only by itself it also fails to prepare us for the future.

In spite of the overwhelming weight of scientific evidence that it has on its side, this perspective has not gained the hearts and minds of the large public, due to economic and political factors as well as to the actions of climate change deniers. The media has also a role to play in this, as it often prefers sensationalism to scientific evidence. Providing climate change deniers the same coverage as scientists is *not* reflecting journalistic professionalism. On the contrary, the climate change deniers are overevaluated by the media. When we consider both their numbers and their arguments, "the balance of the argument in logic and evidence is 99 (or more) to 1, not 50-50" in favour of the scientists (Stern, 2009, pp. 131–132). At the same time scientists alone cannot promote change effectively—unless the business and political circles sustain the reform, it can hardly happen. I believe however that the effort of advocating the environmental cause is more effective if it is channelled at the public rather than submitted to the approval of the business community.

Those who argue against climate change often state that we do not yet have all the scientific evidence to be able to properly evaluate the climate changes before deciding on the best action to counter their effects. I think that any time lost on such debates is precious, and it is better to err on the side of caution. As Homer-Dixon puts it:

> Which bet do we want to make? Do we bet that the energy scarcity and climate change aren't going to hurt the world badly, and invest our resources elsewhere?
>
> If we're right, we save some money, but if we're wrong, the consequences for our children could be catastrophic.
>
> Or do we bet that energy scarcity and climate change could indeed hurt the world badly, and invest to prevent that outcome?
>
> If we're right, our children avoid possible catastrophe, but if we're wrong, we lose some money. (2009, p. 206)

The environmental perspective is probably also harmed by the reaction of fear it is likely to generate in the public. I am not advocating in favour of a different policy, because scientific evidence cannot be and should not be embellished. The scientific community has done a good job in standing its ground and being faithful to the findings of scientific inquiry, but unfortunately its opinions have not convinced everyone. This situation might change if the same efforts that are today spent on discrediting scientific evidence were to be spent on educating the public about the consequences of climate change.

Ideally the two perspectives, the "business perspective" and the "climate change perspective," should merge; if this would happen, we would have a significant chance to become better equipped for the challenges of the future. In this sense, the efforts deployed by sustainability organizations are worthwhile. The scientific community tries also to bridge this gap and facilitate a better understanding of the problems that we are going to be faced with. These efforts are, however, small in

comparison with the enormity of the task and the powerful interests that oppose it. It is also of crucial importance not only *if*, but also *when* these two tendencies will merge; the sooner the better:

> What it comes down to is this. You and I happen to be alive at a critical juncture of those two opposite trends. We have the power to destroy this living earth, and that destruction is ongoing, even accelerating. But more of us are realizing that change is necessary and within our grasp if we just decide to reach for it. How will it all come out?
>
> We'll know soon enough, for I believe that *where* [italics added] these two trends—accelerating destruction and a growing awareness—intersect is where the fate of humankind will be decided. (Anderson, 2009, p. 226)

As long as our efforts are widely split between these two very different orientations, I think we cannot succeed. The above citation comes from somebody who embodies the most notable exception to this split. It is someone who, coming from the corporate world, is well on his way to "climb Mount Sustainability"—Ray Anderson (and his corporation *Interface*). There are, however, notable differences between Ray Anderson and almost everybody else involved in this debate: He is *both* the CEO of a large multinational company *and* has an exceptional sustainable vision. This very unusual set of qualities has translated into exceptional—but unfortunately quite unique—achievements: Compared with 1994 (when Anderson decided his company would become sustainable), by 2009 *Interface* has reduced greenhouse gas emissions by 82%, cut fossil fuel consumption by 60%, cut waste by 66%, cut water use by 75%, while at the same time it has increased sales by 66% and raised profit margins

(Anderson, 2009). If such amazing results can be achieved by a large company in only 15 years, what would the world look like in 2025 if every other company followed its example?

What I find most remarkable about Ray Anderson and his company is that once he realized that his operation was contributing to the destruction of the planet, as a corporate citizen he did not fall victim to an "either–or" approach which could have led him, for example, to sell the company and live a secluded life trying to minimize his *personal* impact on the environment. Should that have happened, not much would have been achieved: under a different management, the company is likely to have been just as destructive today as it was in 1994.

Pursuing an environmental agenda at the expense of the economy, as some argue, is short-sighted and unrealistic. We cannot turn back "the clock of progress," so to say, and we cannot survive, at least as a civilization, in the absence of an economic activity able to provide our means of subsistence and sustain our societal hierarchy. At the same time, we should make sure that the economy is serving us, and not the other way around.

How this is going to happen and finding out *who* can lead us toward the "other kind of civilization" are two very important issues not yet defined. Following my previous arguments, I think that our future leaders would need to have a different approach than our current political, business, and even some of the environmental leaders. I will argue in the following chapters that in my opinion a leading role in this paradigm shift will be assumed by smaller communities. The solutions that will be found, as I see them, will not be uniformly applied but will rather be individualized by

each community according to its needs. The question remains whether enough communities will embrace this vision and will be able to put it into practice.

Two Important Hypotheses and Arguments Against Them

I argue that the human civilization may suffer severe setbacks later this century, due to a combination of natural and man-generated factors, and that the philosophy of John Dewey can offer a theoretical foundation that can guide our efforts of preparing for, and dealing with, these challenges. These are two important hypotheses of my thesis, and different authors have criticized each one of them. In the following pages I will examine four important criticisms and analyze their arguments.

The Rational Optimist *by Matt Ridley*

The first hypothesis, that human civilization may suffer important setbacks later this century, has many opponents. One of them, Matt Ridley, argues in his book *The Rational Optimist* (2010) that "there is no reason we cannot solve the problems that beset us: of economic crashes, population explosions, climate change and terrorism, of poverty, AIDS, depression and obesity" (Ridley, 2010). In his view, being self-sufficient means being poor, and, if we want to solve all the challenges we face, we need to encourage trade, specialization, and exchange of goods and ideas to promote modern technologies and to eliminate bureaucratic red tape.

Many of Ridley's (2010) arguments on how specialization and commercial exchanges have led to innovation and progress are convincing, but they are limited by an exclusive focus on the economic aspects of human evolution. Economy, in Ridley's opinion, is an overarching activity that can provide the answer as to why humans became such a successful species and were able to spread all over the earth:

> I am going to argue that the answer lies not in climate, nor genetics, nor in archaeology [*sic*], nor even entirely in culture; but in economics. Human beings had started to do something to, and with each other, that in effect began to build a collective intelligence; they had started for the very first time to exchange things between unrelated, unmarried individuals, to share, swap, barter and trade. . . . The effect of this was to cause specialization, which in turn caused technological innovation, which in turn encouraged more specialization, which led to more exchange, and progress was born. (Ridley, 2010)

Economic specialization and trade encourage innovation, but to consider them the most important factors in human evolution seems to me a narrow view. Ridley (2010) believes that other potentially important factors, such as politics and culture, are accentuating differences between people rather than encouraging them to exchange, and he sees them mostly as hindrances to progress. Homer-Dixon, however, has argued that the distinctive feature which made the human brain and consequently the human civilization so powerful was *not* specialization but, on the contrary, the development of "*generalist* [italics added] strategies for survival," which allowed humans "to thrive in a wider range of conditions" (Homer-Dixon, 2001, p. 199).

Ridley (2010) claims that he is a *rational* optimist because he has "arrived at optimism not through temperament or instinct, but by looking at the evidence" (Ridley, 2010). I took therefore to analyzing some of the evidence he provides. The following few pages examine the arguments advanced by Ridley on two important issues related to this thesis: climate change and modern technology. However, I found

Ridley's arguments to be questionable on other issues such as the fall of the Roman Empire,[22] the genetic engineering of plants, the industrial raising of animals for meat consumption, and the financial and social impact of megaretailing companies such as Wal-Mart; many of these arguments are mentioned in footnotes. An in-depth analysis of Ridley's work is beyond the scope of this thesis.

The main thesis advanced by Ridley (2010) states that economic development, trade, free markets, labour division, and specialization lead to progress, which in turn stimulates innovation, leading to the creation of wealth. This process is not only self-sustaining, but it tends to expand, at least until the wealth created becomes too tempting and is appropriated by political elites, or priests, or the military, who inevitably become monopolistic and stifle the very economic engine that has made their domination possible.

Most of Ridley's (2010) ideas are not new; in fact, they are quite similar to the arguments advanced by the "Hard Greens" more than a decade ago:

> The outside world imposes no limits to growth on a society that unleashes the real kind of efficiency, economic efficiency. Resources don't limit growth; markets find or create new ones. Pollution need not limit growth; turn pollution into property, and capitalists will package pollution and transform it into wealth. . . . On all sides, free markets create abundance. Efficiency—the real kind, discovered by markets, not bureaucrats—creates still more abundance. Complexity creates efficiency, which creates still more abundance. (Huber, 1999, pp. 146–147)

Ridley (2010) subscribes to all these tenets and adds a few more: that human intelligence was by and large brought into existence and developed by exchange and specialization and that the steady (albeit erratic) growth we have experienced since the beginning of human civilization proves and guarantees the fact that this growth will continue; not in any conditions however—only if we continue to specialize and exchange goods and ideas and if we fight bureaucratic red tape. Specialization and exchange are rightly seen by Ridley as important characteristics of the capitalist system, in which everyone works for everyone else.

Hardly anybody denies that science has opened the way to enormous improvements in the quality of life of the average human being. It is however questionable and risky to consider the capacities of science limitless or to disregard credible scientific evidence. For example, Ridley (2010) presents arguments in favour of some aspects of modern food production, such as the factory-style production of meat. I found Ridley's arguments on these matters very questionable.[23] Other examples of presenting carefully selected evidence can be found in Ridley's rendering of the "beneficial" aspects of big-box retailing[24] or in his strong support in favour of genetic engineering.[25]

The risks and costs associated with climate change represent an important area in which Ridley's (2010) arguments are seriously flawed. On the one hand, he plays down (as many climate change deniers do) the risks of climate change by pointing to the very large range of possible temperature increases advanced by the IPCC (from 1.1°C to 6°C). In the previous chapter I have shown however that a 2°C increase is almost certain and a 3°C increase is hard to avoid, and more recent assessments point

in the same direction: "Science tells us *a global peaking in 2015* [italics added] and a 50 percent reduction compared to 2000 levels by 2050 is needed to achieve a 2 degrees Celsius limit" (Figueres, 2011). There can be almost no doubt that a global peaking by 2015 will *not* happen, especially after the accidents that occurred at nuclear centrals in Japan as a consequence of the catastrophic earthquake from March 2011; they have made people even more reserved about nuclear energy. Unfortunately, nuclear fission is the only reliable energy source that could at the moment help wean the world off of its fossil fuel dependency.

On the other hand, Ridley (2010) cherry-picks the evidence provided by Stern (2007, 2009) on the costs of mitigating climate change:

> As for what might happen after 2100, in 2006, the British government appointed a civil servant, Nicholas Stern, to count the potential cost of extreme climate change far into the future. He came up with the answer that the cost was so high, that almost any price to mitigate it now would be worth paying. (Ridley, 2010)

These statements are extremely biased. The extensive studies presented by Stern (2007, 2009) are not only mentioning "the potential cost of *extreme* climate change *far into the future* [italics added]", but they focus mostly on how much it would cost us if we decide to mitigate climate change *now* (which we should, but probably will not do). The costs advanced by Stern are the following: "Achieving 500 ppm[e] might cost 2% of the world GDP per annum over the next half-century, while 550 ppm[e] would cost around 1%" (Stern, 2009, p. 48). These costs are far lower than the extremely high ones that Ridley (2010) is hinting at. Just as a side note, portraying

Stern a "civil servant" is unfair and displays yet again Ridley's tendency to handle evidence in whatever way it is advantageous to him (this is probably also an attempt to diminish Stern's status and point to the "bureaucratic red tape"). Stern is a distinguished academic economist who has taught at MIT and was chief economist of the European Bank of Reconstruction and Development from 1994 to 1999 and chief economist and senior vice-president of the World Bank from 2000 to 2003.

Some of Ridley's (2010) most troubling statements come when he endorses without any reservation the recent advances in modern computer and communication technology. He considers wireless communication technologies and the Internet as essential tools that ensure greater connectivity, increase specialization, and offer better economic opportunities to all. In spite of the advantages it offers much of the time, greater connectivity can also have severe negative consequences, such as the worsening of the spread and depth of economic crises due to panic reactions. For example, *low* connectivity is credited in part for slowing the spread of the Asian financial crisis from 1997–1998. The fact that China was *not* fully integrated in the worldwide system of capital markets probably "helped protect modern capitalism from itself" (Homer-Dixon, 2008, p. 183). The rapid spread of new diseases can be offered as another example of the potential disadvantages of high connectivity.

I think it is useful to develop in a few paragraphs the theme of computer and communication technology, because this is a sector that has very strong connections to our modern economy, which, as it has been argued in the previous chapters, is the main contributor to the crises of climate change and resource depletion. I agree with Ridley (2010) when he argues that modern technology has simplified many menial

tasks and has rendered several areas of human activity more efficient. However, I find his approach biased because technology is not bringing only advantages, but it also poses threats. These threats are not taken into account by Ridley.

A very serious potential threat posed by modern technologies is related to how they modify human activity and also the human brain. We rely more and more on computers for doing not only menial, but increasingly complex and important tasks. Some foresee that one day the "mechanisms of trade, bureaucracy and our daily lives will be handled by machines talking to machines" (Berners-Lee, as cited in Carr, 2008, p. 221). The company Google has plans (possibly under way) of scanning the content of the libraries of the world into its databases, *not* with the purpose of being read by people, but by Artificial Intelligence (AI) machines (Carr, 2008, p. 223). It is not far-fetched to believe that computers have the potential to acquire to some degree what is considered today exclusively human thinking and take over tasks that involve thinking algorithmically in order to arrive at a decision; algorithms that have allowed computers to dialogue with humans in a seemingly intelligent manner have been developed since the 1960s (Carr, 2010, pp. 201–204).

The future development of AI raises some very important concerns: If computers can go as far as acquiring sentience and human thinking abilities,[26] how are they going to behave when that stage is reached? These concerns are highly speculative, and I will not deal with them here,[27] but I think the foreseeable development of AI has the potential of not only redefining the relationship between humans and computers but also of influencing *our* future intellectual development. It is possible that humans (or many of them) could become auxiliaries to "an intellectual

machine whose workings and ends are beyond us" (Carr, 2008, p. 228). Is *this* the life that we would like to live? But then, are we going to be *able* to live a different one? The ferocious advances of computer technology challenge not only our future occupations but also our brains. Some argue that the switch from printed books to modern electronic media, as well as the very extensive and increasing use of social media, are changing how we think and are also "rewiring" our brains.

Books need to be read in silence, and as a consequence they favour concentration and focused thinking. They also represent depositories of the intellectual development of humanity, from which new intellectual life can spring. In the words of John Milton:

> For books are not absolutely dead things, but do contain a potency of life in them to be as active as that soul was whose progeny they are; nay, they do preserve as in a vial the purest efficacy and extraction of that living intellect that bred them. (Milton, 1644/1984, p. 181)

How is the experience of reading a book in print different from the experience of reading it on a screen? Regardless of the fact that books in electronic format can be *updated* just like any other software, or even be remotely deleted, the screen is not just the electronic translation of a printed page. It offers much more functionality, and this brings opportunities as well as threats.

Some of the opportunities are the following: The reader can instantaneously search the book for any word and thus quickly access relevant information, can have access to the definition of any word, or to many related entries that he or she may be interested to examine. Some of the threats come from the fragmented experience that

is detrimental to meaningful reading: "The need to evaluate links and make related navigational choices, while also processing a multiplicity of fleeting sensory stimuli, requires constant mental coordination and decision making, distracting the brain from the work of interpreting a text or other information" (Carr, 2010, p. 122). In the long run, the new media may also influence the way books are *written*. Shortly after books became common following Gutenberg's invention, the authors

> quickly jumped beyond the limits of social speech and began to explore a wealth of distinctively literary forms, many of which could exist only on the page. The new freedom of the private writer led . . . to *a burst of experimentation that expanded vocabulary, extended the boundaries of syntax, and in general increased the flexibility and expressiveness of the language* [italics added]. Now that the context of reading is again shifting, from the private page to the communal screen, authors will adapt once more. (Carr, p. 107)

I think the reference to the *communal* screen in the above passage needs to be explained. Access to definitions and related entries are just a small part of what the new media can enable users to do. A last generation "tablet" computer or "intelligent" phone offers almost everything one can imagine in terms of information, communication, and entertainment. It offers, well, a phone, plus a myriad of other applications, "apps," that can cater to almost any need of their users, and, most important, enable them to do more than one thing at a time. For example, we can assume the user is reading the book in question while she is in the back of a cab heading toward the airport for a business trip. As she clicks on a word to double-check

its definition, an email notification appears on the screen and needs to be dealt with because it is an urgent request from the office. Her husband texts to let her know he was able to book the dates for their vacation. A friend sends a video capturing the first steps of his grandson; she will watch it later, because she needs to call the daycare and mention the children will be picked up by her husband. At the same time she feels hungry, so she opens another app to see what restaurants are available at the airport and what deals they offer.

If this sounds familiar to many of us, it is because it becomes more and more common. More people are connected for more hours each day and share with one another many of the things they do, including reading, listening to music, watching movies, and shopping. In this sense, the screen is indeed becoming *communal*, and books have to compete with a variety of other sources of information and entertainment. As a consequence, somebody who writes a new book would want it to generate as much Internet traffic as possible. This criterion can have a significant influence on how books are written, because multitasking users have difficulty interpreting a complex text and also because sophisticated phrases generate less traffic than simple ones (because they are used less often). The more people use a search term or click on a link, the higher these will rank on future searches (Carr, 2010, pp. 153–155). I think Carr judges correctly the threats posed by this new trend: "As social concerns override literary ones, writers seem fated to eschew virtuosity and experimentation in favour of a bland but immediately accessible style. Writing will become a means for recording chatter" (Carr, p. 107).

We live increasingly in a mass culture of images and entertainment, which destroys our ability for critical thought, or for dealing with complex and ambiguous situations (Hedges, 2009, p. 49). This kind of culture is also creating a dangerous fault line between a cultured and (print) literate minority and the rest of the society (Hedges, 2009, p. 190). Technological advances notwithstanding, I think it is culture rather than speed or convenience that can enable a person to develop analytical thinking skills, to become able to deconstruct the claims of politicians and advertisers, and to develop a better understanding of the world:

> Advertising, propaganda, the speeches of politicians, popular books and magazines, the clichés of rumour, all have their own kind of pastoral myths, quest myths, hero myths, sacrificial myths, and nothing will drive these shoddy constructs out of the mind except the genuine forms of the same thing. (Frye, 1997, p. 44)

One of the statements made by Ridley (2010) in his book is that "prosperity is simply time saved . . . proportional to the division of labour. The more human beings diversified as consumers and specialized as producers, and the more they then exchanged, the better off they have been, are, and will be." In the light of my previous arguments about the opportunities and threats brought by contemporary technologies, such statements should appear quite limited and shallow. While being able to do so many things at one time offers multiple benefits, enjoying the time thus saved is not one of them. The more one is multitasking, the more tasks are being thrown at him or her, and this frenzied activity blurs the distinction between working time and private time. Some people are so busy that they need the help of professional organizers and

pet walkers to take care of activities that used to belong strictly to personal home life (Ridley could eventually argue this is beneficial because it generates even more exchange and specialization). The "next stage," of connecting computers directly to the brains of people, exists already as a distinct possibility, although it is not (yet?) favoured by many (Carr, 2008, p. 215).

I mentioned that this technology is also changing the neural circuitry of our brains, and I will end this line of argument with a few considerations on this matter. Children and youth are very high users of the new technologies:

> A Kaiser Family Foundation report released last year [2010] found that on average, children ages 8 to 18 spend 7 hours and 38 min. a day using entertainment media. And if you count each content stream separately—a lot of kids, for example, text while watching TV—they are logging almost 11 hours of media usage a day. (Conley, 2011, p. 55)

This enormous amount of usage of electronic media could have very important consequences. Children and youth have very plastic brains and are also very astute with these technologies, so they are seriously at risk to experience anatomic changes in their brains due to their extensive multimedia usage. Their neural circuits are reacting quickly to multimedia events: "Each time we get a message or text our dopamine reward circuits probably get activated, since the desire for social connection is so wired into us" (Wagner, as cited in Conley, 2011, p. 56). I think this probability is quite high—in February 2011 I was present at a conference hosted by the Canadian Internet Registration Authority, on which occasion I could see displays of positron emission tomography (PET) images showing comparisons of the brain activities of

people from different age groups. When presented with multimedia content, the brains of people from "Generation Y" or younger (who have been accustomed to computer technology from childhood) showed evidence of about twice as much activity in comparison with the brains of people from older generations, including "Generation X" (Brody, 2011).

The consequences of this changed neural activity can imply no less than the deterioration of those portions of the brain that help processing focused tasks and the development of those that process instantaneous, scattered tasks:

> We have separate circuits, it turns out, for top-down focus—i.e., when we set our mind to concentrate on something—and reactive attention, when our brain reflexively tunes in to novel stimuli. We obviously need both for survival, whether in the wilds of prehistory or while crossing a street today, but our saturated media universe has perhaps privileged the latter form and is wiring our kids' brains differently. (Conley, 2011, p. 56)

Being able to follow many trivial tasks at one time but unable to concentrate on any one of them long enough is hardly a good preparation for the challenges that await us. These mental habits are making us "increasingly deracinated, cut off from our past and unreflective about our future" (Homer-Dixon, 2001, p. 336). They could however help us be content for a while, living as simple appendages of the technology we have created. I am only raising a concern here, and I am not trying to draw any conclusions, because I am aware of the high uncertainties associated with this technology, its evolution, and future uses; it has also been argued that "a *renaissance of attention* may be at hand" (M. Jackson, 2008, p. 235). I do not think we are fated to succumb to the

threats posed by technology, and becoming aware of them is the first necessary step in launching a process of inquiry that could eventually inform our future choices.

One question that Ridley (2010) asks rhetorically in his book is the following: "On what principle is it, that when we see nothing but improvement behind us, we are to expect nothing but deterioration before us?" (Babington Macaulay, as cited in Ridley). This question resonates deeply throughout Ridley's work, and his arguments imply that, actually, there is no such principle. The overarching message of Ridley's book would then be to leave all worries behind, engage in specialization and exchange, and hope that everything will fall into place, as it has happened so many times in the past. If my understanding is correct, then I find the book very simplistic. If we see nothing but improvement behind us, I think we choose to ignore the often cyclical development of many institutions and forms of government, the slow and tedious achievements of science until a couple centuries ago, as well as the suffering of countless numbers of people due to war, famine, disease, and persecution. It is true that "this generation of human beings has access to more calories, watts, lumen-hours, square feet, gigabytes, megahertz . . . and of course dollars, than any that went before" (Ridley); this represents however a strictly material achievement that is largely dependent on oil and is distributed around the planet in a highly inequitable manner. Even in rich countries, "health care and education are among the few things that cost more in terms of hours worked now, than they did in the 1950s" (Ridley). Few, but essential; although both domains have benefited from the scientific advances of the last few decades, there are many people (some living in developed countries) who cannot have access to either health care or education due to their high costs.

Seeing nothing but improvement before us (because, as Ridley implies, it would be illogical to see deterioration) could lead us to commit a serious conceptual fallacy. It has been exemplified already that in most situations Ridley (2010) argues that "new equals good." I have hopefully substantiated that in the case of genetic engineering and communication technologies his arguments are superficial at best; however these flaws do not appear in just two particular cases but go deeper, at a conceptual level. Considering that anything new is an improvement over the old raises the possibility "to dispense with ethical considerations" (Russell, 2005, p. 711). I see this as a theoretical flaw that undermines much of Ridley's staunch belief in the inevitability of progress.

Ridley (2010) seems also unaware of a flaw impacting his main argument about the importance of economic activity for human progress. Economic considerations can indeed be a stimulus for any activity, but they can also hinder it. More important, they introduce an extraneous variable that soon "takes on a life of its own" and dictates how and even *if* the original activity is to be pursued. I can, for example, start a baking business if I have a passion for baking, but in order to stay in business I have to *make money*. I know this can be the beginning of a long argument that I have no intention of getting into; I only want to point that business considerations are not always beneficial for progress, as argued by Ridley; I have already discussed this in Chapter Two, and I also mentioned the drawbacks of such an approach when I discussed the business incentives of becoming more sustainable.

Throughout his book Ridley (2010) "shows a surprisingly casual attitude toward logic and evidence" (Easterly, 2010) and is "happy to ignore the exceptions" to

his arguments (S. Jones, 2010). Ridley is not successful in proving we will be able to solve our future crises using solutions that worked in the past. In this sense, his book "might best be described as irrational optimism—a blind belief that what has worked before will always work, regardless of a changing environment, whether financial or planetary" (Pearce, 2010).

In the last sentence of his book, Ridley (2010) states that the 21st century will be "a magnificent time to be alive" and exhorts his listeners to dare to be optimists. The first 11 years of this century have been, there is little doubt, far from magnificent, and this can change only if we are highly successful in dealing with our many and serious challenges. There are strong arguments showing that our focus on specialization, exchange, and continued progress are major contributing factors to our current crisis. I cannot be the type of optimist advocated by Ridley, because concentrating all our efforts into specializing and exchanging goods and ideas, with the hope that everything else will be fine, is an approach that I find far from rational. His book describes an unimaginative act of hope.

The Global Deal *by Nicholas Stern*

Unlike Ridley, who focuses exclusively on the benefits of specialization and exchange of goods and ideas, Stern provides an objective and detailed analysis of the relationships between the environmental and economic aspects of climate change. Stern states correctly that the markets send wrong messages about greenhouse gases because they fail to capture the true costs to society of producing goods with dirty energy (2009, p. 11); he also proposes ways to correct this problem, such as including

the damages from the emissions in the price of products (eliminating externalities) and offering financial incentives for cutting emissions (Stern, p. 100).

Stern argues convincingly that it would be economically beneficial to take quick action to mitigate climate change; tackling the problem now so we can hold "atmospheric CO_2e concentrations below 550 or 500 ppm is likely to cost around 1-2% of GDP for the next few decades" (2009, p. 90). However, the future cost of inaction is likely to be much higher due to the increased probability of higher temperatures and extreme events (Stern, pp. 91–92). It has been pointed out elsewhere that emissions trading, if it is adopted worldwide, could offer financial benefits of more than $60 billion; at the same time the Kyoto protocol would be respected (Singer, 2002, p. 24). New low-carbon industries could provide jobs for many people while being less risky than the dotcom or housing bubbles of the last years (Stern, p. 195).

Stern also calculates the total cost of dealing effectively with climate change: A reasonable funding throughout the following decade should be of the order of $140 billion annually (2009, pp. 178–179). If this amount seems too high, one needs to consider that in 1997 the value of the services provided to humanity by ecosystems amounted to "$33 trillion or more" per year. For comparison, the World's total gross national product (GNP) for 1997 was $18 trillion (Wilson, 2002, p. 106). The services provided by the natural environment "include the regulation of the atmosphere and climate; the purification and retention of fresh water; the formation and enrichment of the soil; nutrient cycling; the detoxification and recirculation of waste; the pollination of crops" (Wilson, p. 106).

I disagree with Stern's solution of an international agreement that would include the development of new technologies, emission reduction targets, carbon trading mechanisms, funding amounts, and sources (Stern, 2009, pp. 146–147). This solution appears to me as unrealistic. While highly desirable, such an agreement would most likely need a new international organization, eventually a "World Environment Organization" (Stern, p. 200). I think such an institution is highly unlikely to come into being, considering that "our [U.S.] lawmakers are heavily under the undue sway of special interests" (Hansen, 2009, p. 242). The oil and coal industries see a serious threat in shifting away from carbon-based energy sources, and they muddy the waters of "both science and the economics" to sustain their current practices (Stern, p. 36); at the same time, the results of our efforts to deal with climate change will depend mostly on the actions we will be taking "over the next decade or two" (Stern, p. 174).

A "global deal" such as the one envisioned by Stern would be effective in facing the challenges ahead, but only *if* it would come into being soon enough. However, "any realistic assessment of the prospects for international agreement would have global emissions peaking closer to 2030 rather than 2020" (Hamilton, 2010, p. 22). Restructuring the energy economy by 2020 would require nothing short of "a wartime mobilization, an all-out effort" (Brown, 2011, p. 117); unfortunately, there are no signs such an effort is ongoing, in spite of its urgency. The media often distorts scientific evidence due to a desire for sensationalism, and the issue of climate change is not getting the attention it deserves (Stern, 2009, pp. 131–132).

The purpose of switching the global energy supply system away from fossil fuels would require an extremely high level of political will and international co-

operation. Considering that "it is very difficult for politicians to make significant changes within the present economic and political framework" (Taylor, 2008, p. 204), this is not a realistic goal. I think there is a strong chance the global deal envisioned by Stern (2009) may materialize too late, if at all; in such a case, the solution I will propose has the merit of mobilizing local communities for the development of solutions appropriate for their needs.

G. Taylor (2008) models future societal change as follows: "1) People lose faith in the industrial system as crises worsen; 2) Human and economic resources are released from the system; 3) Support increases for both inclusive (sustainable) and exclusive (ethnocentric) solutions" (p. 207).

We have probably reached the first stage and are heading toward the second and third. Reaching those stages (I see them as more or less simultaneous) would lead us toward a bifurcation point that can take us on one of two trajectories, depending on whether the sustainable or ethnocentric ideas end up prevailing. According to G. Taylor (2008), "if sustainable solutions are supported, constructive reorganization begins" (p. 207); alternatively, "if ethnocentric values and structures dominate, conflicts over scarce resources intensify," in which case "global civilization disintegrates" (p. 207).

My educational initiative is focused on influencing this bifurcation point. There are two reasons that make me think the efforts should be concentrated on developing *local* solutions: The breakdown of the current system could increase the autonomy of smaller communities; and the solutions to be developed need to take into account the local circumstances. Moreover, a community will not have valid alternatives to the

ethnocentric "solution" unless it would have already developed and tried its own solutions. In such a case both community resilience and democratic practices will be enhanced.

G. Taylor (2008) anticipates a further integration stage in case we are able to take a positive turn toward sustainability—in that stage "the reorganization of the global system *accelerates* [italics added]" (p. 207). I see this stage as maybe occurring later in the future, if at all. If a significant number of local communities develop solutions for resilience and sustainability and are viable over the long term, they could eventually establish contacts and determine which of their local solutions present commonalities. I am most doubtful regarding the *acceleration* mentioned by Taylor (2008, p. 207)—it appears as though all we have to do is choose sustainable solutions *now*, and then through reorganization and integration a new harmonious society will appear. The *global* character of such a change makes it, in my view, untrustworthy; our current problem is not that we have chosen a *wrong* development path—it was probably adequate a couple centuries ago. But success usually reinforces itself and leads to rigid rules; they are abstracted into unquestionable principles, which, coupled with the self-serving interests of the ruling classes, lead to the formation of powerful but inadaptable power structures bound (over the long term) to certain failure.

It is probably better in our current situation to aim for the more modest—but essential—objective of avoiding systemic failure and to prepare in such a way that the coming crises leave us "battered but not broken" (Steffen, 2011). Should we succeed, we will have the opportunity to plan for the more distant future; we should, I think, become wary of overarching principles and "ideal" solutions, and we should start

cultivating a vigilant mindset. I am aware however that local solutions are also questionable, and I will discuss this limitation in the conclusions of the thesis.

Education, Cultural Myths, and the Ecological Crisis *by C. A. Bowers*

The second hypothesis stating that the philosophy of John Dewey can offer a theoretical foundation that can guide our efforts in preparing for, and dealing with, the challenges that lay ahead has also been criticized. Bowers's critique focuses mainly on what he perceives as being "Western anthropocentrism" and "man over nature" biases in the philosophy of John Dewey in general and his theory of inquiry in particular. In the light of these perceived biases he considers that John Dewey's thinking is unfit to guide our attempts to deal with the environmental challenges that have already started to unravel. Bowers questions whether in the future Dewey will be seen "as a forerunner of deep ecological thinking or as a liberal thinker who framed the problem of modernization and social justice in terms of the Western assumptions we are now beginning to recognize as part of the problem," and his critique is suggesting the latter is true (Bowers, 1993, pp. 104–105).

These accusations of anthropocentrism are not something new[28] and they are related to Dewey's lifelong preoccupation with people and the betterment of their lives. John Dewey himself perceived these accusations as a "misconception of his philosophy," which he attempted to clarify in *Experience and Nature* (Bernstein, 1966, p. 78). Bowers (1993) thinks that the anthropocentric orientation makes Dewey unreceptive to the traditional wisdom of cultures (other than Western) that have developed ways of relating intimately with nature: "In short, Dewey understood that the individual always operates within an environmental context, but could not

recognize other ways of knowing and communicating that more ancient and ecologically oriented cultures have developed" (Bowers, p. 98).

It is worth analyzing what are these "other ways of knowing and communicating" and what alternatives they offer. Bowers (1993) refers mostly to the cultures of First Peoples; he claims that Dewey is denying a voice to "cultural groups that evolved a more spiritual and poetic (metaphorical) form of consciousness. The deer, trees, and mountains are not the source of analogic knowledge in Dewey's world, nor do they share in the sacred unity of the universe" (Bowers, p. 98).

It is true that after the European colonization of North America the ecological state of the continent worsened significantly and that the environment was very much present in the life of the First Peoples: "And although Indians lacked the perfection of environmental saints, they did possess a culture that demanded less of their nature than did the Europeans of the early modern era" (A. Taylor, 2001, p. 5). The First Peoples have developed a more harmonious relationship with their local environments following a process of trial and error: Those who arrived by foot about 15 thousand years ago (the climate was very cold at that time and the levels of the oceans were lower) from Siberia to North America found a land "free from other humans and abounding with plant and animal life" (Taylor, p. 8). This new land provided them with an abundant diet, which led to an explosion of human populations and a subsequent extinction of many animal species (Taylor, p. 8). Lacking new technological discoveries, the First Peoples had to "learn their local environments more intimately to harvest shellfish, fish, birds, nuts, seeds, berries, and tubers"

(Taylor, p. 8). They also needed to develop their hunting into "the patient and prolonged tracking of more elusive [and smaller] mammals" (Taylor, p. 8).

The arrival of the European colonists (who possessed more advanced technologies, among which firearms represented one of the most important) was marked by further extinctions of animals as well as by the extermination or submission of First Peoples (A. Taylor, 2001, pp. 451–452). It is questionable how their civilizations would have developed without the intervention of the colonists and if their harmonious relationship with nature would have lasted. In other civilizations, which were able to evolve without a massive disruption such as the one imposed by colonists onto First Peoples, there seems to be a "common pattern in the development" (Stokes Brown, 2007, p. 164). It roughly unravels as follows: Populations of hunter-gatherers invent agriculture and the raising of animals; their economic output increases, creating surpluses; these surpluses have to be managed and guarded from enemies, which leads to the appearance of bureaucratic and military classes. The development of urban centres follows, and gradually, people start to feel detached from their natural environment.

If the societies of First Peoples had developed along a similar industrial path they would have gradually become estranged from nature as well, in which case their culture would have ceased to be relevant with regard to environmental policies. However, at the time the Europeans colonized North America, their sensibilities were different: "From the native perspective, it seemed that the colonizers had exhausted their intelligence in making their metal and cloth goods. Preoccupied with dead matter, they appeared insensitive to living nature" (A. Taylor, 2001, p. 20). Unfortunately we

will never know if the First Peoples were about to take a different developmental path; this raises an important difficulty with regard to our current realities: It is hard to advocate in favour of adopting a different path when the concrete elements of that development have never materialized.

George Santayana seems to have advocated a holistic relationship with nature, and Bowers (1993) echoes him when he further criticizes John Dewey: "The crux of the problem, according to Santayana, is that Dewey's naturalistic philosophy is subverted by his commitment to what Santayana termed 'the dominance of the foreground'" (Bowers, p. 95). According to Santayana, "in nature, there is no foreground or background, no here, no moral cathedra, no centre so really central as to reduce all other things to mere margins and mere perspectives" (Santayana, as cited in Bowers, p. 95).

The statements of Santayana, as they are rendered by Bowers (1993), seem to raise more issues than they solve. The philosophy of John Dewey can be criticized from many angles, but in at least one area it can stand its ground firmly: It was intended to help people improve their lives, and it does this by "creating theories with meanings amenable to testing by application to human practices" (Hildebrand, 2008, p. 207). This last point is being criticized by Bowers (with a hint to Santayana), because it is seen as doing injustice to other, more holistic perspectives on nature. But how are these perspectives going to influence our future choices?

Bowers believes that Dewey "was unable to acknowledge that the scientific model of decision making is only *one of many valid forms of knowledge* [italics added], and that valuing substantive traditions is not always a betrayal of human

intelligence" (Bowers, 1993, p. 102). Not valuing traditions or considering them unintelligent is *not* a characteristic of Dewey's criticism of past modes of thinking; and Dewey mentions explicitly that knowledge is *only one mode of experience* among others (Dewey, 1909/2005, p. 190). Bowers also mentions several alternatives "profoundly different" from "Dewey's view of knowledge, with its built-in anthropocentrism" (pp. 98–99). Their common point is a traditional, holistic, approach toward nature.

I argue however that such an approach could hardly be applied in our lives. If one lives on a farm, it is probably easier to reconnect with nature in a meaningful sense, but how about the very many of us living in cities? An attempt to live sustainably in a city, without generating waste, can have only limited results and is achieved at the price of significant personal hardship (Beavan, 2009, p. 190). I enjoy spending vacations away from civilization; I find it quieting and comforting to spend several days with only my family and immerse in the complexity and subtle rhythms of nature. As much as I enjoy it, I am aware this is neither a way of living for us nor a solution for the future. We are spending approximately 10 days in the wild each year, and we are able to do so because we are prodded by the artefacts of civilization. Bowers also concedes that "it is easy to romanticize these views of tradition, as they are often associated with a past that was simpler and less ambiguous than today's society" (1993, p. 102).

We need indeed a profound shift in how we conduct our daily lives if our civilization is to survive and flourish, but it is delusional to think this shift will come if we carry on with our "business as usual" approach while at the same time yearning for

a simpler life in harmony with nature. Allowing these yearnings an outlet may serve a useful psychological role by reducing our anxiety, but continuing to support the status quo and postpone meaningful action is dangerous; the two tendencies together are probably another expression of the confused priorities that were mentioned at the beginning of this chapter. I think we have no choice but to accept the complexity and ambiguity of our society and to adopt a human perspective on solving our problems. It is going to be *us*, after all, who are going to engage in any future course of action.

Bowers (1993) criticizes John Dewey's method of inquiry on the grounds that "it is still the Enlightenment hubris of rational thought ('the method of intelligence') making sense of a material world of flux and indeterminacy" (Bowers, p. 98). The words "making sense of a material world" reflect a mind–matter dualism that underlies Bowers's interpretation of the pattern of inquiry. This is not consistent with Dewey's thinking: Throughout his philosophy he emphasizes an experiential / transactional approach that bridges this dualism as well as others (theory vs. practice, art vs. science). In Dewey's view, "the only distinction worth drawing" is "between those modes of practice that are not intelligent, not inherently and immediately enjoyable, and those which are full of enjoyed meanings" (Dewey, as cited in McClelland, 2005, pp. 44–45).

Bowers's (1993) statement could almost be phrased as "John Dewey is going to advance his agenda of rational thought with disregard for the changing nature and indeterminacy of the world." I think such a statement would be unfair. While believing strongly in the scientific method, John Dewey always emphasized the practical

validation of theoretical knowledge. He is thoroughly opposed to unquestionable theoretical principles, and his conclusions are always provisional:

> There has been a search for the absolute, rock-bottom foundation on which we can construct the edifice of knowledge with absolute certainty. . . . Dewey argues that we never have any such absolute first principles. More strongly, we never *could* [italics added] have such first principles. (Bernstein, 1966, p. 112)

Moreover, "it is an illusion to think that the validation of knowledge requires such an absolute foundation. Knowledge is validated in the context of inquiry, and inquiry itself is a self-corrective process" (Bernstein, 1966, p. 112). In the light of the above passage, it appears to me that Bowers (1993) is searching for a "first principle foundation" himself:

> What he [Dewey] did not recognize was that the method of thinking itself is a powerful means of deauthorizing traditional sources of authority, but weak in providing *the basis of new forms of authority* [italics added], especially those forms of authority that serve to limit the emergence of an anomic form of individualism. (Bowers, p. 104)

Bowers (1993) admits therefore that the method of inquiry is a powerful tool for questioning accepted practices or institutions and invalidating them if they are wrong, powerful to the point of destroying such institutions to the ground and thus raising the spectre of anomic individualism. But what "new forms of authority" could Bowers be referring to? He is not clarifying this, but I think any form of authority can to some extent "serve to limit the emergence of an anomic form of individualism." However, the antonym of anomic individualism is, unfortunately, authoritarianism. It

appears to me there is a surprising split between Bowers's admiration and longing for a holistic and intimate relationship with nature and his desire to subject human action to authority; I think John Dewey would be right in subjecting both of these tendencies to inquiry.

Culture and language are two domains that underlie the current crises of climate change and resource exhaustion; they could, in Bowers's (1993) view, also help us formulate solutions for solving these crises. In closing this section, I will examine culture and language from this perspective. I will start by asking a few questions: What is Bowers's definition of culture? What is his conception of culture as an agent of change? Is this conception relevant for the current crises?

Bowers defines culture as a web of invisible patterns that guide the thoughts and actions of people in unconscious but powerful ways. Bowers uses Geertz's (1972) definition of cultural patterns to explain their pervasive character: "Culture patterns – religious, philosophical, aesthetic, scientific, ideological – are 'programs'; they provide a template or blueprint for the organization of social and psychological processes, much as genetic systems provide such a template for the organization of organic processes" (Geertz, as cited in Bowers, 1993, p. 21). Bowers then qualifies Geertz's definition of cultural patterns by mentioning they "can be partly understood at the explicit level of awareness and changed as a result of thought" (p. 21). Bowers describes these patterns as being "the largely invisible yet always present sources of authority in people's lives" (p. 21); they "are experienced as part of the person's natural attitudes" (p. 22) and "represent past forms of understanding that have been encoded in the patterns that underlie current experience" (p. 22).

But what are these patterns? Can we define them more precisely? Which patterns underlie the Western culture? Bowers (1993) points to "Cartesianism " and "Enlightenment" as the current paradigms of our time:

> In the course of our discussion, the terms "Cartesianism" and the "Enlightenment" will be used as a means of identifying the historical and cultural origins of ideas and values that now tend to be associated with a universal form of modernism. "Cartesianism" will be used when referring to those aspects of modern consciousness that can most directly be traced back to Descartes' mode of thinking, with its dualisms and linear procedures of thinking. Although Descartes' legacy has undergone important modifications, we are still, at the deepest level of our thought process, Cartesian thinkers. (pp. 24–25)

To allow for a more thorough examination of these cultural patterns, it is useful to examine the details of Descartes's "dualisms and linear procedures of thinking" (Bowers, 1993, p. 24). According to Russell (2005) "the kernel of Descartes's theory of knowledge," which "contains what is most important in his philosophy" (p. 516) is the following: "'I think, therefore I am' makes mind more certain than matter, and my mind (for me) more certain than the minds of others" (p. 516). Descartes's theory of knowledge had important consequences: "There is thus, in all philosophy derived from Descartes, a tendency to subjectivism, and to regarding matter as something only knowable, if at all, by inference from what is known of mind" (Russell, p. 516).

Descartes's philosophy "brought to completion, or very nearly to completion, the dualism of mind and matter which began with Plato and was developed, largely for

religious reasons, by Christian philosophy" (Russell, 2005, p. 519). As a consequence, "the Cartesian system presents two parallel but independent worlds, that of mind and that of matter, each of which can be studied without reference to the other" (Russell, p. 516).

Bowers's (1993) reference to Descartes's "linear procedures of thinking" (p. 24) is probably regarding Descartes's understanding of the physical world: In the

> whole theory of the material world, Cartesianism was rigidly deterministic. Living organisms, just as dead matter, were governed by the laws of physics; there was no longer need, as in the Aristotelian philosophy, of an entelechy or soul to explain the growth of organisms and the movements of animals. (Russell, 2005, pp. 519–520)

In the light of these considerations, the cultural pattern currently underlying modern societies is the following: We conceive, as Bowers (1993) says, "at the deepest level of our thought process" (p. 25), a deterministic material world governed by physical laws that we can understand and control. Mind is of primordial importance; it is superior to matter (including plants and animals), which, being "dead," can only serve as raw material and can be used as humans see fit. Humankind is distinguished by its use of the rational mind which sets it apart from the rest of living creatures. If this interpretation is correct, then Bowers is right in seeing it as a major contributing factor to our current crises. But why is this interpretation of the world so deeply embedded in our psychic makeup? What made it "sink," so to say, "at the deepest level of our thought process" (Bowers, p. 25) and become so pervasive?

One explanation could the following: Some of these ideas, expressed through religious beliefs and social customs, have been a part of our *lived* experience for 2,000 years; Descartes has made their role even more important, and the Enlightenment has emphasized "the authority of reason in guiding people's lives, [and] the belief in the inevitability of progress" (Bowers, 1993, p. 25). The role of reason in guiding the lives of people has further increased following industrialization, and the 20th century has brought, in spite of two horrifying wars, significant progress for many people.

It has been discussed elsewhere that language has become more abstract as human societies evolved; this reflects the growing estrangement between humans and nature (Abram, 1997). Bowers (1993) points to other relevant connections between language and thought: "For example, thinking of the heart as a pump encodes the earlier assumptions about the mechanistic nature of the universe; thinking of North America as 'the New World' encodes the privileged European perspective" (p. 26).

Our worldview is therefore rooted in cultural traditions going back to Ancient Greece, has been reasserted by the philosophy of Descartes and the further developments of the Enlightenment and industrialization, and is reinforced by our use of language. It is therefore not surprising we have become so accustomed to its ideas that that they have become basic unquestioned assumptions.

This takes me to the second question I asked at the beginning of this argument: What is Bowers's conception of culture as an agent of change? Bowers's (1993) thoughts about feminism and other social reform movements may offer a hint on how this question could be answered:

> As the ongoing feminist movement has shown, as well as other recent social changes that could easily be cited, it is possible to affect changes in people's thought and behavioral patterns at the deepest levels when the changes become a new part of *taken for granted* [italics added] culture. (p. 31)

This passage makes me wonder why we would want to replace one set of taken-for-granted assumptions with another; in such a process two mistakes would be made: first, we would assume that we can unequivocally define "right" and "wrong," and second, we assume that our definition is fixed and unchangeable. The problems we are confronting now in relation to the rationalistic paradigm stem from a similar approach.

This also raises a doubt on the usefulness of the concept of culture seen as a web of invisible patterns. Late in his career, Geertz (2002) doubted the validity of his earlier concepts of culture, which were used by Bowers (1993) in his arguments. Geertz acknowledged "the paradox, real or otherwise, of the simultaneous increase in cosmopolitanism and parochialism" in recent years and called "for an anthropological rethinking of our *master political conceptions* [italics added], nation, state, country, society, people" (p. 14). It is also questionable if feminism or the other social change movements that Bowers alludes to have become so ingrained in contemporary culture as to state that "it is possible to affect changes in people's thought and behavioral patterns *at the deepest levels* [italics added]" (Bowers, p. 31).

With these reservations, it can be acknowledged that *lived* experience can become ingrained (which should however not make it unquestionable) and lead to cultural change. However, in order to assess if Bowers (1993) offers a viable

alternative for dealing with the consequences of climate change, I need to examine whether his conception of cultural change is relevant for this crisis. To bring societal change through challenging taken-for-granted assumptions is a worthwhile endeavour; a very difficult one nonetheless, because in this process we are likely to discover that our problems are not generated by a web of "invisible patterns" but by a set of unconscious and interlocking habits associated to personal and societal values. Habits and values are notoriously difficult to change because they carry affective connotations and they are deeply embedded in the lives of people and communities.

It may also be that Bowers was overly optimistic regarding the potential of cultural change (when he wrote his book the society was not as saturated with information as it is today). Bowers (1993) was forecasting the following:

> As the world's population begins to experience the environmental consequences of moving toward the 10 billion mark, along with the effects of economic activity associated with creating additional jobs and raising the standard of living . . . the ecological crisis will become *a concern of television executives, theologians, governmental officials, and even the heads of multinational corporations* [italics added]. Each group, in terms of the aspects of the culture they most influence, will be faced with rethinking the most fundamental aspects of their taken-for-granted belief system. (pp. 32–33)

It is sad so see 18 years later that most of these groups have done quite the opposite—they dug their heels in the ground and, far from "rethinking the most fundamental aspects of their taken-for-granted belief system" (Bowers, p. 33), they

resist even small changes and contribute, often in a direct manner, to the worsening of the crises that confront us.

Bowers's approach is valuable, in spite of its difficulty, and could be used in trying to initiate deeper long-term societal changes. However, for the climate change crisis this approach is impractical due to *the lack of time* (the situation may have looked different in 1993 when Bowers's book was published). It has been shown that we have only a few more years (until 2020?) to implement changes that could be effective in reversing the current path and avoiding the worst consequences of climate change. After that, natural positive feedbacks will take the planet on a heating path, and we cannot know when the heating will stop. It has also been shown that the more we delay action, the worse the impacts of climate change are likely to be. The political and technological challenges we face are daunting already, and we simply lack the time to build up a social movement focused on cultural changes. The experience offered by feminism and other social change movements is relevant in this respect.

This is not meaning that social action is unimportant; quite the contrary. It is one of our few hopes, but I do not see it as taking place in the context of a deep cultural change. It would rather happen through reaching an unforeseen tipping point in the public opinion. In the aftermath of the recent Hurricane Irene, the mayor of New York said that the city had "dodged the bullet" (Swayne, 2011). The increasing frequency and severity of extreme events may give sudden visibility to credible scientists who try to warn the public about climate change and may facilitate the emergence of political leaders ready to take action (see Endnote 21).

In conclusion, some of Bowers's (1993) ideas can be useful through their emphasis on alternative approaches that could help us redefine our relationship with nature. At the same time, I have shown earlier in this chapter that John Dewey's method of inquiry withstands with success Bowers's criticism and that we can use it as a tool in our search for warranted solutions. I think this method can guide our efforts in preparing for, and dealing with, the challenges of the future, and in the next chapter I will explain how it has been used in the development of this thesis and how it can contribute to increasing community resilience.

Bertrand Russell's Critique of John Dewey's Theory of Inquiry

The theory of inquiry has also been criticized by Russell (1939/1951, 2005). Russell's criticism first appeared in 1939, following the publication of Dewey's *Logic, the Theory of Inquiry* (1938/1986); John Dewey answered Russell's criticism later in 1939. I will present briefly some of the original exchanges between Russell and Dewey (1939/1951) regarding one of Dewey's main philosophical orientations, the concept of experience (rendered sometimes as "situation"); I will also discuss Russell's critique of the process of inquiry, which is seen as potentially dangerous due to what is perceived as an unacceptable relativism regarding the notions of truth and knowledge.

A thorough analysis of Russell's criticism and Dewey's responses extends beyond the scope of this thesis, as this subject has been treated extensively (Burke, 1994). Russell begins his criticism by emphasizing the importance of John Dewey's philosophy as a "social phenomenon" (Russell, 1939/1951, p. 137). While this emphasis captures well Dewey's dedication to the betterment of society, it also

introduces an undertone of doubt with regard to the value of Dewey's philosophical work. It is interesting to note that Russell took a similar approach when he analyzed the legacy of Rousseau: "Whatever may be our opinion of his merits as a thinker, we must recognize his immense importance as a social force" (Russell, 2005, p. 623); in this case the approach was fair, since "Rousseau was not a systematic, lucid or rigorous thinker" (Plamenatz, 1969, p. 661), but in the case of John Dewey it was not.

Dewey's indebtedness to Hegel is emphasized by Russell (1939/1951, p. 138), and it is used to substantiate a point of view from which Dewey's experiential approach is seen, due to "an inevitable consequence of the insistence upon continuity" (Russell, p. 139), as "an attempt to analyze the universe" (Russell, p. 140). While admitting the influence of Hegel, Dewey rejects vigorously Russell's inferences:

> Mr. Russell, however, finds that what I write about *situations as the units of experience* [italics added] springs from and leads directly to the Hegelian variety of absolutism. One indirect reason he presents for this belief, when it is put in the form of an argument, runs somewhat as follows: Mr. Dewey admits not only that he was once an Hegelian but that Hegel left a permanent deposit in his thought; Hegel was a thoroughgoing holist; therefore, Dewey uses "situation" in a holistic sense. I leave it to Mr. Russell as a formal logician to decide what he would say to anyone who presented this argument in any other context. (Dewey, 1939/1951, pp. 544–545)

Dewey rejects Russell's accusations of holism by explaining that in his approach "situations" have been repeatedly defined as having a "pluralistic and individualized character" (Dewey, 1939/1951, p. 545), as well as a mediating one, and

can therefore be seen as "the only form of pluralism that is intellectually tenable" (Savery, as cited in Dewey, p. 545). Dewey further clarified this point by stating that "almost everything I have written is a commentary on the fact that situations are *immediate* in their direct occurrence, and mediating and mediated in the temporal continuum constituting life-experience" (p. 546).

Russell cites the definition of inquiry (Dewey, 1938/1986, p. 108) and then places it side by side with a couple of examples of "inquiry," which, in Russell's view, would be reasonable applications of this definition: "a drill sergeant . . . transforming a collection of raw recruits into a regiment, or of a bricklayer transforming a heap of bricks into a house" (Russell, 1939/1951, p. 143). These examples are claimed to have "a degree of rhetorical force which Dewey could not afford to have ignored" (Burke, 1994, p. 111); I agree that the examples have significant rhetorical force, but I disagree with Burke's assessment that Dewey should have made his notion of inquiry more explicit in his response in the Schilpp volume (Burke, pp. 110-111). Such metaphors are a landmark of Russell's writing, which is greatly enlivened by their use; however, I think their very rhetorical force should caution one in taking them at face value. For example: "'If pigs have wings, then some winged animals are good to eat; now some winged animals are good to eat; therefore pigs have wings.'" (Russell, p. 149). I think such an example can hardly be used to support a critique of the notion of warranted assertibility, which is in this case the aim of Russell's arguments (p. 149). Russell himself exposes the fallacy of a similar example, of the "blind men . . . beating gongs to frighten the heavenly dog": "This illustration shows that our generalization must not

use merely the method of agreement but also the method of difference" (Russell, p. 152).

Back to the examples of the drill sergeant and the recruits or the bricklayer and the bricks, they *start* by not being contiguous even with the indeterminate situation which initiates the process of inquiry, so they can hardly constitute appropriate examples for a critique of inquiry: "Inquiry and questioning, up to a certain point, are synonymous terms" (Dewey, 1938/1986, p. 109). Furthermore, "it is of the very nature of the indeterminate situation which evokes inquiry to be questionable; or in terms of actuality instead of potentiality, to be uncertain, unsettled, disturbed" (Dewey, p. 109). I can see no evidence of any uncertainty or unsettledness in Russell's examples, which, in spite of their poignancy, describe only the mechanical application of a rigid set of rules. Dewey's method of inquiry is nowhere close to something like this; it is arguably the antithesis of a mechanistic approach, "a self-correcting enterprise which can put *any* claim in jeopardy, though not *all* at once" (Sellars, as cited in Bernstein, 1966, p. 113).

I think therefore that Dewey is right in his decision of not further expanding his critique of Russell's arguments:

> If I now cut somewhat short my discussion of the criticisms passed by Russell upon my theory of truth, it is partly because my discussion up to this point indicates the particular context – *that of the problematic situations* [italics added] – in which my view is set and which must be taken into account in discussing my view; and partly because former, rather extended, corrections of misconceptions on this point have indicated that nothing I can say will

> eliminate them from the minds of some of my critics. (Dewey, 1939/1951, p. 571)

Some 20 years before Dewey published his *Logic*, Russell expressed the opinion that pragmatists have an "instinctive belief in the omnipotence of Man and the creative power of his beliefs," and he thought that a philosophy that empowers humans was most appropriate for a young continent like America. (Russell, 1919/1977, p. 252). In his criticism of Dewey's (1938/1986) work he continues on the same train of thought with the assertion that pragmatism can be used to provide support to any subjective personal desire, regardless of its nature or usefulness; however, Dewey is strongly refuting this idea (1939/1951, p. 572). This refutation is very important because it establishes that wishful thinking cannot have any part in Dewey's definition of truth (or rather warranted assertibility). Truth has a very high degree of relatedness to the initial situation that led to inquiry because it "is not verified just by any kind of satisfaction, but only by that satisfaction which is born of the fact that a working hypothesis or experimental method applies to the facts which it concerns and effects a better ordering" (Parodi, as cited in Dewey, 1939/1951, p. 572). This refutation is also important for my concluding arguments regarding what Russell perceives as potential threats posed by John Dewey's theory of inquiry.

Dewey argues convincingly that propositions (discourse) are not an appropriate subject-matter for inquiry, but only means for it, "so that as conclusions of a given inquiry they become means of carrying on further inquiries. Like other means they are modified and improved in the course of use" (Dewey, 1939/1951, p. 573). On this matter, Russell seems to have totally different points of view: According to Dewey, he

believes "(i) that propositions are from the start the objects of inquiry and (ii) that all propositions have either truth or falsity as their inherent property" (Dewey, p. 573). In spite of this explanation, several years later, in the chapter on John Dewey from his *History of Western Philosophy*, Russell reiterated similar arguments: "The first question is: What sort of thing is 'true' or 'false'? The simple answer would be: a sentence" (Russell, 2005, p. 731). He also repeated several of the examples and arguments used in his original 1939 critique, even if some of them were refuted by Dewey in his response.

Russell states that "Dewey's interests are biological rather than mathematical, and he conceives thought as an evolutionary process" (2005, p. 731); this is accurate. At the same time, Russell's work in logic has "an emphasis on mathematics" (Burke, 1994, p. 265), and as a consequence Russell is comfortable with the notion that "truth, as conceived by most professional philosophers, is static and final, perfect and eternal" (p. 731). This makes it difficult for Russell to conceive truth as an "ideal limit towards which endless investigation would tend to bring scientific belief" (Peirce, as cited in Russell, 1939/1951, p. 144). To continue this mathematical analogy, defining truth in a final and exact manner (as in an equation) is different from defining it in a transactional manner (as in a limit); however, from a pragmatic point of view this difference can often be ignored. At the same time, inquiry has the significant advantage that any solution that comes out of it is organically related to the conditions that prompted inquiry, rather than being imposed through an external judgment.

In spite of the arguments exchanged between Russell and Dewey in 1939, which showed that Dewey was strongly opposed to a notion of truth that can be

arbitrarily decided by humans and give support to their every whim, Russell continued to be uncomfortable with the idea of an evolving truth. For him, truth needed to have a fixed, unchangeable nature, or otherwise "all bets are off." He believed that a philosophy based on an experiential truth (or warranted assertibility) could be manipulated in any way and could enhance, even if unintentionally, the dangers of an already too obvious human hubris (Russell, 2005, p. 737).

There seems to be indeed an "intoxication of power" that pervades our culture "and to which modern men . . . are prone" (Russell, 2005, p. 737); I think however this intoxication of power is made possible by the *un*thinking and careless manner in which we often behave when faced with a complex and ambiguous reality. We should be concerned that our world seems so "uncertain, unsettled, disturbed" (Dewey, 1938/1986, p. 109); moreover, we should make this discomfort the starting point of scientific inquiry. Instead, many of us are only too happy to lay our discomfort to rest and to adopt (with significant help from advertisers, politicians, and the media) simple, static solutions that pretend to solve our problems once and for all.

To quote Russell, "if I doubt whether I am a fine fellow, I can cure the doubt by a suitable dose of alcohol" (1939/1951, p. 147). Such a solution, while it is probably satisfactory for the short term, represents a disaster for the long term; inquiring into whether I am indeed a fine fellow could make me feel uncomfortable, but, should I reach the conclusion that I am not, could open the door to further inquiries, such as *why* am I not, and *what* I can do to change this. This would be probably generate discomfort and require much effort in the short term but would also open the way to finding adequate solutions for the long term. While being aware of the

limitations of such a particular example, I think a philosophy that promotes inquiry, in a sense consistent with John Dewey's conception of the term, can be helpful rather than threatening for our civilization.

It has been stated that Russell is not credible when he criticizes Dewey's work as a logician (Burke, 1994, p. 265). However, I think it is fair to say that, beyond their disagreements, Russell and Dewey shared similar concerns and examined them from different perspectives. In the light of the exemplary social engagement showed by both of them when dealing with the important issues of their time, today they could have possibly joined their forces to help us face the monumental challenges of the 21st century. On the one hand, the consequences of our unthinking absorption into the consumerist lifestyle and its cults of technology and efficiency, coupled with our disregard for nature, are taking more and more the shape of facts that "are stubborn and cannot be manipulated" (Russell, 2005, p. 735). On the other hand, these same facts continue to be ignored or denied by powerful social forces that have the interest to manipulate people so they do *not* engage in meaningful scientific inquiry and continue to "be happy" while disregarding the long-term consequences of their actions.

The Myth of the Roman Empire

I will conclude this chapter by arguing that the most important change that we need to bring in order to deal with the crises that we are likely to be faced with is a cultural change. Humans have often attempted to live beyond their means, and as a consequence civilizations have crashed (Stokes Brown, 2007, pp. 98–99). Crashes notwithstanding, human civilizations and their institutions have followed a repeated (and natural) pattern of emergence, growth, maturity, decline and decay. In the

Western world however, once maturity was reached, neither people nor institutions were looking forward to decline and decay, but, *un*natural as this is, to more growth—and as a consequence they overextended themselves. We can hardly look *forward* to decline and death, but according to many spiritual traditions, death and birth, decay and renewal are seen as two faces of the same coin; death can attach value to each moment, *because* it is perishable, and it can, paradoxically, make one feel more *alive*. Death does not have to be scary, even if one is firmly convinced that the physical world we perceive through our senses is "all there is," that the afterlife does not exist, and that death will bring the irreversible annihilation of oneself. A scientist who shares this very perspective describes his thoughts and feelings toward death as follows:

> I accepted that death might be the penalty to pay for the advantages of all other human powers, not just to see and to think, but to be alive in the most raw, undefined sense of the word, to be conscious, to be me. If death was the fee for having life to be paid at the end, then I accepted the bargain with open arms. (Volk, 2002, p. 66)

However, a desire for eternal youth, accompanied by a corresponding refusal of death is often seen in our society, at a personal but also at an institutional level. At a personal level, the fear of decline and decay has biological roots in the (unexamined) fear of death; at an institutional level, the Western embodiment of a "powerful and eternal empire" can be traced to the civilization of ancient Rome. Its current incarnation, if we can call it so—the Western civilization—has acquired, due to technological progress and the abundant energy (still) provided by oil, a level of prosperity unthinkable even a generation ago. At the same time, it has become

insensitive to the fact that, in spite of our prowess, humans are and will be, for the foreseeable future, a part of the web of life of this planet. If we threaten it, as we currently do, we threaten ourselves.

Roman history continues to fascinate mankind, and the fall of the Western Empire in 476 AD still has the connotation of a catastrophe (Homer-Dixon, 2008, p. 246). The prevailing perception about it is that a strong civilization fell quite suddenly, and great numbers of people were thrown into lawlessness and need. This is largely untrue; I will argue that the *concrete* effects of the fall were minimal, and that the catastrophe has much more significance from a psychological point of view than from a historical one.

Rome was probably established in the 8th century BC and grew slowly (Momigliano, 1969, p. 507); it reached significant political stability and prosperity only in the first century AD (Scullard, 1969, pp. 525–527). A century later, Rome attained the zenith of its power and embodied a strong human yearning for rule of law, peace, prosperity, and progress, which, I argue, is still strongly felt today. One could say "that the human race was never happier than in this period" (Gibbon, as cited in Scullard, p. 536), although it has lasted only a few decades. Toward the middle of the second century AD, during the reign of Antoninus Pius, "men could speak of the *felicitas saeculi* ('happiness of the age') with real feeling, and Aelius Aristides could deliver a eulogy of Roman rule" (Scullard, p. 535). At that time however, the seeds of decline had already appeared.

At the beginning, they were hardly observable, like "a touch of autumnal chill in the warm air of the Indian summer" (Scullard, 1969, p. 535). However, by the end

of the same century, the decline had become apparent: Social discontent was soon followed by significant uprisings (Scullard, p. 537) which ended in civil war (Haley, 1969b, p. 538). The empire could not function any longer using the model of the early emperors, when a small number of Roman citizens, mainly from Italy, ruled over non-Romans, and in 212 AD the emperor Caracalla granted Roman citizenship to all freeborn inhabitants (Haley, 1969b, p. 538).

With short intermissions, the situation continued to worsen until Diocletian ascended to the throne. Diocletian and Constantine put an end to the sharp decline, but only with the price of very significant reforms, including the splitting of the empire into a western and an eastern half. These reforms bought time but were ultimately not sustainable (Jones, 1969, p. 540). By the fourth century A.D., the Roman army was composed overwhelmingly of "barbarians," mainly Germanic people; large Germanic populations were also living near many of the frontiers of the empire, with the consent of Rome. These populations were considered allies and had the duty to guard the frontiers (Thompson, 1969b, p. 542). Their behaviour was, however, hard to control; for example, in 410 AD the Visigoths captured the city of Rome itself before relocating elsewhere (Thompson, p. 542).

The only major change that happened in 476 AD was political, and, more than anything else, symbolic: Odoacer, a German, deposed the youthful Romulus Augustulus and became emperor himself. As deeply as it still resonates today, this change of reign did not mean a break with established customs: Odoacer was supported by the Roman senate (Thompson, 1969a, p. 864), and his successor Theodoric "The Great," an Ostrogoth, was recognized by the East Roman government

(Thompson, 1969c, p. 990). Between the two of them, the first two "barbarian" kings of Rome ensured 50 years of government, much more stable and arguably better than the governments of the last Roman emperors.

The dark ages followed, but the dream of the Roman Empire did not die. Charlemagne "revived the Western Empire, being crowned Emperor by the Pope in Rome on Christmas Day, A.D. 800" (Russell, 2005, p. 366). And after that,

> throughout the Middle Ages, after the time of Charlemagne, *the Church and the Holy Roman Empire were worldwide in idea, although everybody knew that they were not so in fact* [italics added]. The conception of one human family, one Catholic religion, one universal culture, and one world-wide State, has haunted men's thoughts ever since its approximate realization by Rome. (Russell, pp. 266–267)

Arguably, starting with the 16th century, the same idea has been embodied in the colonial empires of several European countries and, finally, in the worldwide domination of the United States after World War II. The words *Pax Americana* have been used often in modern times, with the same meaning as the words *Pax Romana*, when used in reference to the ancient times. This is probably why the *fall* of the Roman Empire continues to haunt our thoughts as an unwelcome reminder that our dreams of certainty are tenuous at best.

This wish for unending rule of law, peace, prosperity, and progress continues to hold our views set on getting bigger, creating surpluses, dominating others, and spreading our values far and wide. We stubbornly choose not to notice the blatant failings of this worldview, although each year they become harder and harder to

ignore. These failings are not, as some may try to argue, minor or extraneous; I think they are inherent to this worldview—by necessity someone or something needs to get smaller, suffer need, or be dominated.

Finally, this worldview may be linked as much to our biological inheritance as to our desire to escape from it. An efficient monkey trap still used today in parts of Africa consists of a small hole pierced in a thick wood enclosure solidly attached to a tree. A tiny piece of food is placed as bait inside the enclosure. The small diameter of the hole barely allows the monkey to slide its arm through it; it can reach to the food, but in order to take it out from the enclosure it must make a fist. Since the fist is larger in diameter than the hand with its fingers outstretched, the hole becomes too small now, and the monkey is unable to pull its hand out. It could however get free very quickly; all it needs to do is to abandon the food—but it is unable to do so. It keeps its fist clinched around the food and pulls harder and harder; later, it becomes exhausted, but is still not releasing the tiny piece of food, and ends up being caught.

Conclusion

Our view of the world has very deep roots, and this is probably one of the reasons we are so attached to it. It provides us meaning and continuity, and most likely it satisfies important psychological needs; its roots can probably be traced to biological survival mechanisms. This worldview has however become inadequate and keeps us engaged on a path that is becoming more and more dangerous.

Our view of the world is an intellectual construct, and therefore it is going to hold us only as long as we are going to hold it; we could eventually release it, but we are not yet able to do so, due in large part to the economic and political interests

discussed in the first part of this chapter. This situation offers an occasion for pessimism as well as for hope. The pessimism comes from the fact that abandoning this worldview proves to be very difficult;[29] at the same time, the change that we need to enact is essentially cultural.[30] My emphasis on the cultural aspect does not imply that I minimize the other aspects or consequences of this change, political, technological, and so on—it only places at the forefront the need to *accept* this change. We need to accept that our worldview is inadequate and let go of it before we are forced to do so by circumstances beyond our control. We need to admit, without fear, that our "quest for certainty" has failed—and remain hopeful that in doing so we create an opportunity for renewal.

It is in our power to change, and this should help us keep our hopes high. That being said, we need to consider some important questions: Are we using our ability to criticize our ways of making sense of the world? Are we using our abilities to look ahead and plan for the future? What do we need to change, and how?

CHAPTER FIVE: THE PROCESS OF CHANGE

In the conclusion of the previous chapter I argued that the change we need to enact is essentially cultural. Such a change is possible, but at the same time it is extremely challenging: We need to think if "a consciousness rooted in a dead Earth subjugated to our material needs can respond adequately to the climate crisis, or whether we need to rediscover some form of consciousness that recognises a living Earth yet remains scientifically credible"[31] (Hamilton, 2010, p. 146). I also asked three questions that will be analyzed in this chapter: Are we using our ability to criticize our ways of making sense of the world? Are we using our abilities to look ahead and plan for the future? What do we need to change, and how? (J. Novak, personal communication, May 11, 2011). I will start by arguing that we are *not* using our ability to criticize our way of making sense of the world and that we are *not* using our abilities to look ahead and plan for the future. I think it is urgent to change these two negative answers into positive ones, and I will argue that John Dewey's pattern of inquiry can be a powerful tool in our attempts to do so, at a smaller community scale.

While efforts to bring change at a larger scale are very much needed, I think there is a strong chance they may materialize too late, and I have discussed this issue in Chapter Four in my criticism of Stern's (2009) "global deal." However, given the importance of an eventual international mobilization, I will consider a few more aspects relevant to this issue. The first aspect regards the extent of the effort required to stop and reverse the emissions of carbon dioxide into the atmosphere. If this effort is to be effective, several requirements need to be met: "People need to make basic

changes in the way they live. Countries need to cooperate. Matters as seemingly intractable as population [growth] must be addressed" (Hansen, 2009, p. 205).

There is little evidence progress is being made in these matters: In 2009, 83% of the energy consumed in the U.S. was still provided by fossil fuels and only 8% came from renewable sources (U.S. Energy Information Administration, 2010). As shown in Figure 3, fossil fuels (coal, oil, and gas) have clearly dominated the energy supply in the U.S. in the last 50 years and they continue to do so. At the same time, fossil fuel energy leaders are resisting change and continue to manipulate scientific facts with the help of the "denial industry" (Hoggan, 2009, p. 217). The future climate changes are likely to increase international tensions (Paskal, 2010); and in many parts of the world the disempowerment of women leads to high rates of population growth (Hartmann, 2009, pp. 109–110). Moreover, decisive global action should start "before 2012" (Pachauri, as cited in G. Taylor, 2008, p. 209) to be effective.

The second aspect regards the inadequate response that our society has put forth in dealing with the crises of climate change and resource exhaustion. A contributing factor to this inadequate response may be the significant lag that exists between physical sciences and social sciences; this lag has endured for at least 8 decades. The method of empirical inquiry and experimental test triumphed in physical science long ago, and it could greatly benefit the social sciences as well (Hildebrand, 2008, p. 105). In the current context, the benefits of diminishing this gap would be extremely important: While "the natural sciences and the technologies they spawn carry us into the future at bewildering speed. . . . The social sciences plod along behind, unable to generate fast enough the knowledge we need to build new

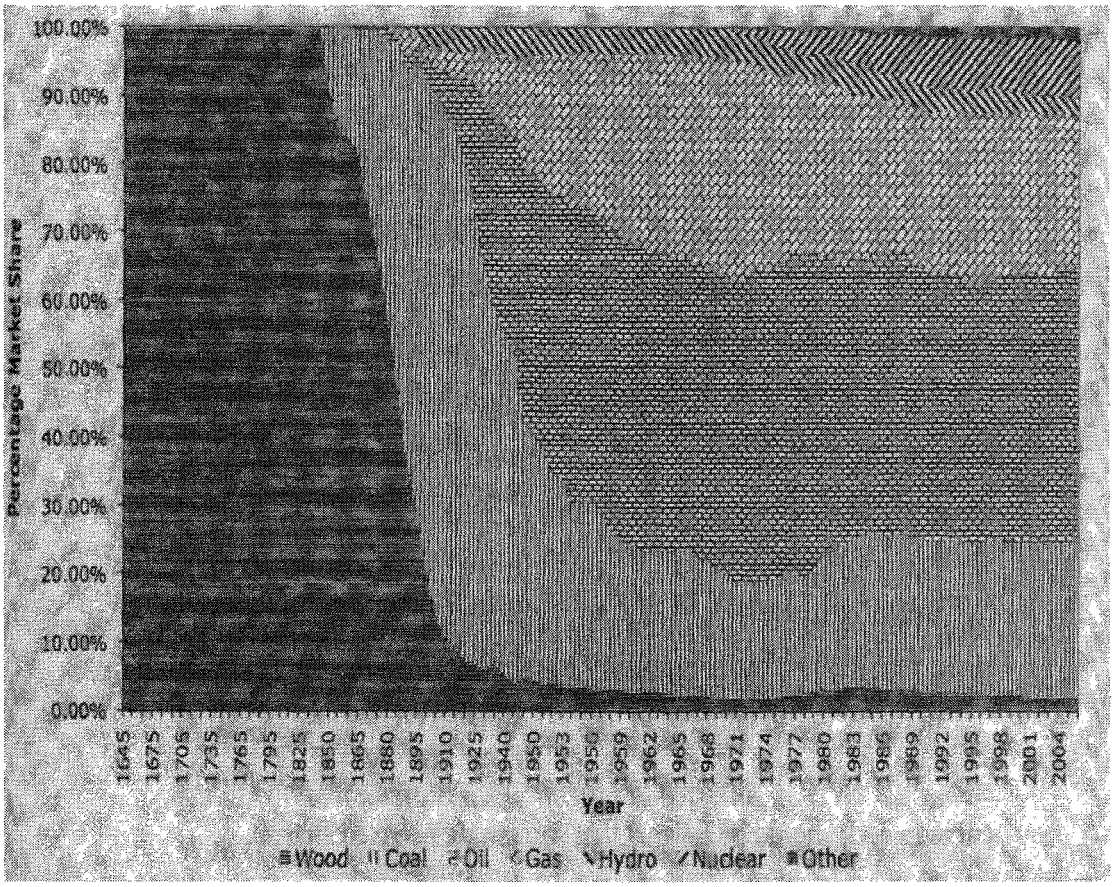

Figure 3. U.S. Energy Percentage Market Share since 1800.

Note. From *Keeping Our Cool* (p. 159), by A. Weaver, 2008, Toronto, ON: Viking Canada.

institutions for our new world" (Homer-Dixon, 2001, p. 293). The complexity of social interactions, the difficulty of conducting social experiments, the arguably reduced objectivity of the researchers are factors that "help to make research difficult, but none seems a decisive explanation, in itself, of the difference in success of the social sciences and the natural sciences" (Homer-Dixon, p. 294).

According to Homer-Dixon, an aspect that may explain the lag between physical sciences and social sciences may be the fact that "while things in the natural world are usually best categorized by their intrinsic properties (mass, density, molecular composition and the like), things in the social world are usually best categorized by their *relational* [italics added] properties" (Homer-Dixon, 2001, p. 457). However, John Dewey has argued that the difference between inquiry into concrete matters ("common sense inquiry") and inquiry into relational matters ("scientific inquiry") "resides in their respective subject-matters, not in their basic logical forms and relations" (Dewey, 1938/1986, p. 118). The main difference between the two modes of inquiry which we can relate to inquiry in physical sciences and inquiry in social sciences is that in the first case the objects of inquiry are qualities (properties) while in the second the objects of inquiry are relations. "In science," Dewey writes, "since meanings are determined on the ground of their relation as meanings to one another, *relations* become the objects of inquiry and qualities are relegated to a secondary status" (Dewey, p. 119). The pattern of inquiry remains however the same in both cases.

John Dewey (1931/2010) has emphasized that "science is strictly impersonal" and that "it owes its operation and its consequences to the human beings who use it"

(p. 200). As a result, "in the degree in which we realize this fact, we shall devote our attention to the human purposes and motives which control its application" (Dewey, p. 200). Instead of choosing our purposes carefully we assumed unthinkingly that, since science is offering us so many advantages, it must be essentially *good*; moreover, since historically science has had a close alliance with the capitalist system (Dewey, p. 201), some of this "goodness" was also extended to capitalism. This may be the source of our unwarranted acceptance of several aspects of contemporary capitalism, in spite of the social ills they generate. For example, we consider it good that modern technologies allow companies to become more and more competitive, but we disregard what will happen to the people who become unemployed in this process. Eight decades ago John Dewey pointed out that

> we have displayed enough intelligence in the physical field to create the new and powerful *instrument* [italics added] of science and technology. We have not as yet had enough intelligence to use this instrument deliberately and systematically to control its social operations and consequences. (pp. 203–204)

According to Dewey, "modern physical science did not develop because inquirers piled up a mass of facts about observed phenomena, but because they *intentionally experimented* [italics added], on the basis of ideas and hypotheses, with observed phenomena to modify them and disclose new observations" (Biesta & Burbules, 2003, p. 73). The physical artefacts of modern civilization are able to respond so well to our needs because of the experimentation they were subjected to; they support John Dewey's statement that "logical forms accrue to subject-matter when the latter is subjected to controlled inquiry" (1938/1986, p. 105). Conducting

similar inquiries in the social sphere would allow us to reduce the gap that still exists (and has widened since Dewey's time) between the tremendous progresses made in physical sciences and the relative lack of progress in social sciences.

Thorough inquiries need to be conducted into both the means *and ends* of social action, and not only into the means, as "politicians and policymakers, hope, expect, and sometimes even demand from social and educational research" (Biesta & Burbules, 2003, p. 76). I find it inexcusable that we do not even attempt to better the lives of people by conducting controlled (in the Deweyan sense) social inquiries while we still have the knowledge and means to do so. The crises of climate change and resource exhaustion are utmost examples of the application of science and technology without consideration for damaging social consequences.

Finally, the third aspect is personal—it provides an answer to the question of what can *I* do, what can *my* contribution be in solving these problems? I have argued that in the context of climate change and resource exhaustion individual action is likely to be ineffective and widespread societal change is unlikely (on this last aspect I have brought several arguments, but I do not pretend to have made a conclusive demonstration—I actually wish that some unforeseen social tipping point is reached and the tide changes, but I cannot count on this). In this context, change at a smaller scale, that of communities, may be (somewhat) effective *and* possible, and something that I could influence.

As a practical application of these ideas I plan to establish a nonprofit organization with two main mandates: to educate the community on the scientific aspects of climate change and resource exhaustion; and to champion community

resilience initiatives. These initiatives will be guided by George Herbert Mead's (1918) considerations on the stages of social service (Mead, as cited in Orbach, 2005, p. 24) and will use as a theoretical framework John Dewey's pattern of inquiry. In the conclusions of this thesis I will sketch a short theoretical discussion regarding the possible development of such community resilience initiatives; however, I will not develop or recommend any *specific* solutions. While I believe that a change for the better *is* possible, specific solutions applicable at a large scale are possible only in the context of a globally concerted effort, and I have argued that, although very desirable, such an effort is not likely to materialize soon enough.

My approach can be criticized; we are well accustomed to being offered solutions for all our problems, not only for mundane ones, but also for personal relationships, career management, or the "discovery of the inner self." A flourishing self-help industry takes advantage of this mindset, and advice is being offered even on how to use self-help advice; according to one author, "often the biggest obstacle in getting what you want is neither bad advice nor your personal failure, but rather not knowing how to use how-to in effective way [*sic*]" (Ruokonen, 2003, p. 113). Not offering specific solutions may lead to the conclusion that my work is unfinished; however, I think such a conclusion would be mistaken for several reasons.

My first argument will use a very basic example, of two persons A and B; let us assume that A has a problem and B is offering a solution. While it is possible that B's advice may help solve A's problem, I think this approach is questionable. Being able to offer advice will allow B to acquire an "expert" status, which is unwarranted if we consider that A's involvement with the problem is probably more extensive.

Moreover, A is not learning, or is learning little from this experience because of not dealing firsthand with its difficulties; if faced again with a similar situation, A may need help once more; the repetition of this pattern presents the risk that A will feel disempowered and dependent on B. This type of relationship is not appropriate between adults, and even less so in complex social situations. It is not appropriate in an educational context either: Biesta and Burbules (2003) mention that educators should not expect knowledge to "tell them what to do," but only to reveal "*possible* connections between actions and consequences" (p. 110).

A more substantial argument, however, can be brought if we consider that what we need is not to find a solution for one particular problem or another but to change a cultural pattern. We need to change a pattern of thinking based on several mistaken assumptions: that we are all-cognizant and all-powerful (these assumptions may be at the root of our belief that we can find solutions to any problem); that our economy will continue to grow endlessly, in spite of occasional downturns; that our resources are plentiful and, if we will need to look for alternative sources of energy, our technological abilities will allow us to do so quickly and efficiently; that climate change is due mostly to natural factors and its consequences are not important. It is very hard to challenge these assumptions due to our complacency with the advantages they offer and to the opposition of the powerful interest groups that are backing them.

Considering a different pattern of thinking (or rather, pattern of inquiry) can in this context offer a meaningful alternative. I will examine two themes using as a framework the pattern of inquiry as defined by John Dewey (1938/1986, pp. 109–120). Before presenting these themes, I will examine the questions mentioned at the

beginning of this chapter: Are we using our ability to criticize our ways of making sense of the world? Are we using our abilities to look ahead and plan for the future? What do we need to change, and how?

I argue that we are not using our ability to criticize our ways of making sense of the world. During the 20th century the human population quadrupled (W. Rees, 2009, p. 303). This exponential population growth was supported in large part by oil, which is used not only to power modern agricultural equipment but also to manufacture fertilizers and pesticides. Oil has also supported the development of many industrial sectors, which brought opportunity and prosperity to many people in the developed world.

The explosion in human population in the 20th century and the unprecedented industrial development that accompanied it have already worrying consequences:

> Energy use increased 16-fold; industrial production grew 40-fold; water use increased nine times; fish catches—but not fish stocks—rose by a factor of 35 (and 90% of the targeted fish biomass had been removed from the sea). . . . CO_2 emissions increased by a factor of 17. . . . Tropical deforestation, desertification, and soil depletion, etc. accelerated. (W. Rees, 2009, p. 303)

At the time of writing, humans are consuming more than 150% of the resources that the Earth has to offer (Leonard, 2010, pp. 152–153). If we assume an average yearly economic growth of 2% (which most economists would probably consider modest), the world economy will double in 35 years. In this eventuality, by 2045 humans would need to consume the resources that could only be provided by *three* planets Earth.

Since economic growth and prosperity have been part of the lives of many people during the last two generations, they are now considered basic assumptions; to analyze them critically is often hard because they are embedded in our self-referential consumerist lifestyle. However, if we accept them unthinkingly we are becoming willing participants in a system that not only puts future generations at risk but also undermines our own hopes of genuine happiness:

> The fallacy of the consumer model is the notion that what we are seeking is, in fact, obtainable in the marketplace. While we may know intellectually that a satisfied life cannot be purchased, we have an economy whose very success counts on our dissatisfaction and is dependent on our continuous effort to make the purchase. (McKnight & Block, 2010, p. 62)

Some believe that they *deserve* to be able to fulfill any desire, and therefore they become increasingly absorbed in a world of materialistic values (Twenge & Campbell, 2009, pp. 161–162). For example, becoming rich and/or famous is now the top priority for a very large proportion of youth in the U.S. (Twenge & Campbell, pp. 162–163). This mindset can offer an explanation as to why profit and wealth are such prevalent preoccupations in the minds of many people, while important and urgent societal issues, such as climate change or resource exhaustion, pass largely unobserved.

These tendencies are worsened by the new digital media. On the one hand, "crass commercialism is also rampant on social networking sites and often overtakes any real friendship that was there to begin with" (Twenge & Campbell, 2009, p. 116), while on the other hand it seems that behaviours learned in a virtual environment can

influence how we behave in real life (Twenge & Campbell, p. 116). Using our ability to criticize our ways of making sense of the world should lead to a closer examination of the desire for wealth and profit. It has been argued convincingly that wealth fails to make people happier, and wealth has been correlated reliably with higher incidences of poor physical health, mental illness, substance abuse, poor relationships, and unhappiness (Kasser, 2002).

The above arguments present some instances in which we are not using our ability to criticize our ways of making sense of the world. I think that by failing to criticize our basic assumptions we also fail to use our abilities to look ahead and plan for the future. Arguably, nothing expresses the concern of a society for its future more than its attitude toward children (I am the father of a 4-year-old daughter and am very concerned for her future). According to Suzuki (2011b), children have a right to ask the adults who look after them, "their parents and leaders, 'Do I matter to you?'" (para. 7). Suzuki argues that most times a positive answer would be dishonest: "For many adults, the honest answer would have to be, 'No, we're more concerned about cheap gas, the economy, profits for the fossil fuel industry, and having more stuff'" (para. 8).

Sometimes youth want to relay the message that adults are unwilling or unable to protect them and they need to take matters into their own hands: A lawsuit launched recently by several teenagers against the U.S. federal government claims that it fails in its duty to "protect Earth for generations unborn" (Barringer, 2011). The lawsuit is likely to serve more to maintaining and increasing public awareness about climate change than to actually force the U.S. government to change its policies (Barringer).

This is arguably normal: It is the public and not the justice system that needs to exercise pressure on the government regarding issues of public interest.

John Dewey mentions that "the materials of legal regulations are transactions occurring in the ordinary activities of human beings and groups of human beings; transactions of a sort that are engaged in apart from law" (1938/1986, pp. 105-106); in Dewey's view, laws represent the official formalizing of such transactions. I think that legislative initiatives (I mean by this term the effort to change policies through court judgments or the design of new legislation) have the drawback of trying to lead the public in a new direction rather than to express the concerns of the public; for this reason, I see them as being less effective in changing policies than public initiatives (I mean by this term the effort to change policies through the involvement of the public). To give one relevant example, racial discrimination came to an end in the United States as a result of the civil rights movement and not of court action; the courts started by pronouncing injunctions *against* the civil rights movement and changed course only after the movement was successful (Sundquist, 2009, p. 30).

I think this drawback also affects other important legislative initiatives made for the betterment of our future, such as the one that proposes that human rights (including rights for the environment) are enacted in an enforceable manner by 2048 (Boyd, 2010). I think that Boyd is mistaken when he states that "2048 is a *gradual* process that leads to deep-rooted social change" (Boyd, p. 2). I think social change is most often the consequence of the desire of a community to change its circumstances; the breakdown of many communities is probably making it harder to initiate social change (J. Novak, personal communication, July 3, 2011). I think such a desire needs

to *precede* any legislative process; the desire for change is deep rooted when it starts from a felt need, a suffering that has to become explicit:

> What the [civil rights] movement proved is that even if people lack the customary attributes of power – money, political authority, physical force – as did the black people of the Deep South, there is a power that can be created out of pent-up indignation, courage, and the inspiration of a common cause, and that if enough people put their minds and bodies into that cause, they can win. (Zinn, as cited in Rogat Loeb, 1999, pp. 103–104)

I think this model of social involvement which gives voice to the hardships felt by a community and conveys its desire for change is different than the one advocated by Boyd. I share the vision expressed by Boyd, but I think his method of bringing it into existence is inadequate. Boyd claims that "through 2048 we can restructure our society to ensure peace, prosperity and a healthy environment" (2010, p. 5). A legislative framework can provide structure, but by itself it cannot lead to the remoulding of our flawed practices into healthy ones. In the words of John Dewey: "Reasoning, as such, can provide means for effecting the change of conditions but by itself cannot effect it" (1938/1986, p. 121). While a legislative component can be useful for a multipronged effort to bring change (J. Novak, personal communication, July 3, 2011), I find that Boyd's claims are overly optimistic and disregard some of the facts underlying our current predicament. We cannot ensure peace when war brings advantages to so many of us. If *cheap* gas is important for us, we may tend to disregard or rationalize the killing of humans thousands of miles away. We cannot ensure prosperity for all in an individualistic society that places utmost value on status and

wealth; and, based on what I learned from my research for this thesis, our environment already shows signs of significant suffering and we need to take urgent and decisive action to restore its health.

Boyd identifies the Cold War, segregation, and colonialism as past obstacles that have contributed to the lack of political support behind an International Bill of Rights (2010, pp. 17–18). An International Bill of Rights continues to lack political support today, and it is possible that new obstacles have replaced the old ones. The Cold War was the expression of the conflict between socialism and capitalism—each system asserted its superiority and attempted to triumph over its opponent; segregation was the expression of the "superiority" of Whites over people of colour; and colonialism was the expression of the "superiority" of Europeans over people from Asia, Africa, and South America. It appears to me that the underlying theme in all these cases is one of domination, of asserting the "superiority" of some over others, often through means of open conflict. This underlying theme is still prevalent today; the West is not fighting against the Communists anymore[32] but is fighting the "war on terror," developed countries continue to dictate their terms to underdeveloped ones, and the interests and priorities of the rich are sharply different than those of the poor. In this context, I think that an International Bill of Rights will likely remain a distant ideal.

I bring a similar criticism to the section of the book regarding environmental freedom. I fully agree with Boyd's vision of freedom for the environment, expressed through preservation, the right of people to participate in decisions affecting the environment, and protection for future generations (2010, pp. 85–90). However,

environmental freedoms will become a reality only if enough people and communities around the world will assert that the environment *and not the economy* is their main concern.[33] After all, there are places in the world without an economy, but none without an environment (Arthus-Bertrand, 2009). I think Boyd is overly confident that *2048* will come to fruition as scheduled and that our civilization will be successful in overcoming its challenges.[34] His optimism is apparent when he details some of the reasons for which the environment should be a part of the International Bill of Rights:

> Our inclusion of the environment [in the International Bill of Rights] is not only for moral reasons, though these are sufficient; it's about the quality of life. Think for a moment about the finest moments in your life: what comes to mind? . . . For many it's moments in the natural environment—hiking in the mountains, swimming in the seas, boating on rivers and lakes, running, biking, and even simply viewing sunrises and sunsets. (2010, p. 87)

I am of the opinion that the above passage reflects not only optimism but also a lack of awareness of the current status of our environment (the book appeared in 2010). Cherishing the "finest moments" in life is a concern that will have to take the back stage if later this century our own survival will be challenged (Cribb, 2010, p. 199). And the moral reasons should not remain in a separate realm but should influence our everyday choices. John Dewey considers the existence of incompatible courses of action, requiring reflective choice, essential for the definition of moral situations: "It is incompatibility of ends which necessitates consideration of the true worth of a given end; and such consideration it is which brings the experience into the

moral sphere" (Dewey, as cited in Hildebrand, 2008, p. 67). We can find examples of such moral choices in our everyday life:

> Yet the buck for looking after the world's food-producing system does not entirely stop with the supermarket, agribusiness firm, or food manufacturer. It stops with the person who eats the food: with you and me. By paying cheap prices for food, as we all like to do, we undermine the capacity of farmers to take care of the resource base and make farming more sustainable. We promote the mining of soil, water, nutrients, fossil energy, and fish . . . . By being uninformed and unaware of a food-production system from which most of us are now almost completely divorced, we unwittingly encourage global prices for food that do not reflect its true cost to the environment or to the people who grow it. This is what most needs to change. (Cribb, pp. 178–179)

Making the choice between buying locally grown sustainable food or going to the supermarket is therefore a moral choice. It is one that represents well the dilemmas we face when we choose to buy something convenient and unsustainable or something inconvenient and sustainable.

An obvious failure to plan for the future is reflected by our lack of foresight regarding the future of our energy supply. We know that the oil and gas resources are going to last only for a few more decades, and yet we do not have clear plans on how to replace the energy they currently provide. I think that a safe assumption (for the year 2050, for example) would be to plan for a future *without* oil and gas. The year 2050 may seem far in the future, but at the same time a thorough overhaul of our energy supply system would take a long time.

First, a series of questions would need to be asked: How many people will the world (or say our country) have by 2050 (there are estimates in this sense, and I think we should use the most unfavourable so that our calculations are safe). What kind of work will they do? What kind of food is going to be available to them? How much energy are they going to need to produce this food? How much energy are they going to need for their work? Would it be possible and useful to do the planning by domain of activity, such as health care, agriculture,[35] transportation, tourism, and so on? If so, what are the requirements for each domain? What are the total requirements? And how is that energy going to be produced?

Asking these questions would probably lead to the conclusion that, without fossil fuels, our energy output will be largely insufficient. This could lead inquiry to consider factors that influence energy consumption: What kind of accommodations would offer the best energy efficiency per person? (single family homes would most likely fail under this criterion; apartment buildings are much more efficient). How can we reduce the energy spent on transportation? The answers to these questions could lead to the design, planning, and implementation of different policies and probably also to the development of new industries that could, more or less successfully, lead the society from our current way of living to one that is going to be sustainable.

In the above passage I do not pretend to even sketch what needs to be done in order to become better prepared for a future without oil and gas, but it should give an idea of the magnitude and complexity of such a planning effort. To define where we need to go and how to get there would require a co-ordinated effort involving specialists from many disciplines, governments, and the public. An additional

difficulty is the fact that currently the only way of obtaining abundant energy in a reliable way without emitting greenhouse gases is nuclear fission; therefore, beside the long time needed for building nuclear centrals, additional time would be needed to obtain public acceptance for them.[36]

Such long-term planning measures would need to be already in the process of implementation for our civilization to be able to change course before the effects of climate change and resource scarcity reduce our capacity to act. The fact that such measures are not even discussed in a systematic way illustrates, in my opinion, that we are not using our abilities to look ahead and plan for the future. Also, major disasters have revealed that even emergency measures, which should ensure effective responses in case of calamities, are sometimes inadequate.[37]

Never before have so many people enjoyed so much affluence as has the Western society during the last few decades. Unfortunately, this affluence seems to mesmerize us; like drunken sailors, we continue our journey full steam, without caring that we may remain without fuel in the middle of the ocean or we may hit a rocky shore.

We need to become able again to criticize our ways of making sense of the world and to use our abilities to look ahead and plan for the future, and I think the pattern of inquiry, as defined by John Dewey (1938/1986, pp. 109–120), can be useful in this process. Two main themes will be analyzed in the framework of the pattern of inquiry. The first theme concerns an analysis of our current response, as a civilization, to the challenges posed by climate change and resource exhaustion; I will contrast this response to what I think I can bring as a contribution to community resilience

education. The second theme concerns the process of developing this thesis and why I decided to change my focus from educating for ecological responsibility to educating for community resilience.

This analysis will follow the headings of John Dewey's pattern of inquiry: the indeterminate situation; institution of a problem; the determination of a problem-solution; reasoning; the operational character of facts-meanings; and common sense and scientific inquiry (1938/1986, pp. 109–120). The last heading is important for the development of abstract theories using scientific methods. Before embarking on this analysis, I will discuss a few more aspects regarding the perspective I am taking in educating and promoting action in smaller communities, and I will discuss briefly the concept of experience as defined by John Dewey.

I have mentioned already that considering the enormous challenges that we are likely to be faced with, any response that is strictly individual is probably going to be ineffective due to its lack of co-ordination with the responses of other individuals (such actions have also the potential of threatening the social order). At the same time, global concerted action is unlikely to materialize soon enough. I think that in this situation a workable alternative is to educate smaller communities and work with them in their search for solutions. Reaching out to other people for social causes can often be challenging; as I mentioned, many people tend to have a bias toward downplaying the importance of climate change and will not be a sympathetic audience for such a topic. Economic uncertainty, concerns about old age, and demanding jobs are not leaving enough time for families and friends and constitute additional obstacles. One may even feel awkward about asking people to get involved:

> It often feels hard just to raise public issues. Unless our acquaintances, colleagues, or friends already define themselves as socially involved, it's awkward to ask them to act or even care about homelessness, global warming, or Bosnia. It feels as if we're intruding on their private liberty, their right to be left alone by the claims and the afflictions of the world. Our culture makes us feel that raising our beliefs in public is like parading some disreputable personal passion. (Rogat Loeb, 1999, p. 31)

Starting a nonprofit organization with a mission of promoting environmental education and action could help navigate some of these difficulties. I am aware that starting a nonprofit organization is a complex and difficult process; however, I think I have a moral obligation to disseminate the knowledge that I acquired as a result of the learning process that I went through in order to write this thesis. The mandates of my nonprofit organization will be to educate smaller communities on the scientific aspects of climate change and resource exhaustion and to work with them in their inquiries toward increasing their resilience.

The notion of experience, or situation, is very important for the understanding of the pattern of inquiry, and it may be worthwhile to discuss it briefly before considering the pattern of inquiry itself. The concept of experience was developed by John Dewey starting from a "reconstruction of the psychological components of human behaviour (instincts, perceptions, habits, acts, emotions, and conscious thought)" (Hildebrand, 2008, p. 9); this concept is invoked in all the areas of Dewey's philosophy: ethics, politics, education, aesthetics, and religion (Hildebrand, p. 9). It is a foundational concept; to give only one example: "Mountain peaks do not float

unsupported; they do not even just rest upon the earth. They *are* the earth in one of its manifest operations" (Dewey, 1934/1980, p. 3). If we are to retain this image, then inquiry, ethics, politics, education, aesthetics, and religion *are* manifestations of experience in a similar way.

In *The Postulate of Immediate Empiricism*, John Dewey offered a detailed account "as to what experience is and means" (1909/2005, p. 189):

> If it is a horse that is to be described, or the *equus* that is to be defined, then must the horse-trader, or the jockey, or the timid family man who wants a 'safe driver,' or the zoologist, or the palaeontologist tell us what the horse is which *is experienced* [italics added]. If these accounts turn out different in some respects, as well as congruous in others, this is no reason for assuming the content of one to be exclusively "real," and that of others to be "phenomenal." (Dewey, p. 189)

According to John Dewey, experience is best described as what is "*experienced as* [italics added]" (Dewey, 1909/2005, p. 189), and the very different perspectives from which it is rendered by different participants are no reason for worry; moreover, knowledge is only one mode of experience among others, and "such an account of the experience of things as known . . . will bring out the characteristic traits and distinctions they possess as things of a *knowing* [italics added] experience, as compared with things experienced aesthetically, or morally, or economically, or technologically" (Dewey, p. 190). The reason other modes of experience are given equal consideration with knowing is that they, as well, can allow a participant to get in touch with things as they are "*experienced as*" (Dewey, p. 190). Knowledge, in the

case of a knowing experience, is developed progressively out of experience itself, and the cognitive dimensions accrue to it as a result of inquiry.

Experience, in Dewey's view, starts from a distinctly biological, precognitive dimension. In *The Postulate of Immediate Empiricism* Dewey details this aspect of experience by giving the example of a situation in which he is startled by an unknown noise (1909/2005, pp. 190–191); in order to assess this experience, he looks for the sentence that best describes what he experienced this situation *as*: Is it "I-know-I-am-frightened, or I-*am*-frightened?" (Dewey, p. 191). Dewey comes to the conclusion that the latter is true. "In all probability . . . the experience is simply and just of the *fright-at-the-noise* [italics added]" (2005, p. 191). This places experience (or rather its beginning) clearly in the physiological realm; the mechanisms that control it are an inheritance of our biological evolution and are actuated by neurological and hormonal mechanisms that are inaccessible to consciousness (Volk, 2002, pp. 28–29). From there, experience continues to evolve, and the cognitive dimension, "I-know-I-am-frightened," becomes a part of it (Dewey, p. 191).

Cognitive dimensions can continue to accrue (obviously, in the case of cognitive experiences): "I should define a cognitive experience as one that has . . . implications which induce and fulfill themselves in a subsequent experience in which the relevant thing is experienced *as* cognized, *as* a known object, and is thereby transformed, or reorganized" (Dewey, 1909/2005, pp. 191–192). I think this passage can serve well to illustrate the relationship between experience and the pattern of inquiry: Although it is of the cognitive sort, this particular experience is described as experienced *as*, which links it to the physiological, precognitive background described

above; at the same time it is also "transformed or reorganized." This transformation, or reorganization, is the essence of John Dewey's pattern of inquiry. I will now analyze the themes mentioned above, discussing them in the framework of John Dewey's pattern of inquiry.

The Antecedent Conditions of Inquiry: The Indeterminate Situation

An important characteristic of the indeterminate situation which precedes and initiates the process of inquiry is a *felt*, precognitive dimension; the indeterminate situation, by its "very nature," is "uncertain, unsettled, disturbed" (Dewey, 1938/1986, p. 109). This feeling of discomfort is a defining element of the indeterminate situation and a "necessary condition of cognitive operations or inquiry" (Dewey, p. 111). Paying attention to how we feel at the beginning of inquiry (or rather, before inquiry even starts) is very important, because our feeling is defined by a "unique doubtfulness which makes that situation to be just and only the situation it is" (Dewey, p. 109).

This feeling will guide the inquiry as it unfolds: "It is this unique quality that not only evokes the particular inquiry engaged in but that exercises control over its special procedures" (Dewey, 1938/1986, p. 109). This feeling constitutes also a point of reference for the whole inquiry: "If we get lost during inquiry we can remind ourselves of how we felt initially" (Hildebrand, 2008, p. 54). The *situation* is the source of doubt, and we are only reflecting this doubt. We should not dismiss our feelings as subjective, and we should not try to manipulate them either; doing so is unhealthy and cannot help clear the situation (Dewey, pp. 109–110). Moreover, disposing of the unpleasant feeling undermines the emotional basis of inquiry.

In analyzing our current response, as a civilization, to the challenges posed by climate change and resource exhaustion, we can distinguish a *lack* of feeling with regard to the seriousness of the situation. In the light of Dewey's arguments presented above this is a very important element. Not feeling doubt or unsettledness removes the emotional need to investigate further and inquiry is aborted before it even starts. The fact that at the time of writing, the atmospheric CO_2 concentration has reached 393 ppm is unlikely to make one feel disturbed unless he or she has taken the time to understand the scientific theories that explain climate change, and most people are not doing this. This reinforces the argument made by John Dewey that a *situation* is not defined by the environment, but by us and the environment, through reciprocal interaction:[38] "Even were existential conditions unqualifiedly determinate in and of themselves, they are indeterminate in *significance*: that is, in what they import and portend in their interaction with the organism" (Dewey, 1938/1986, p. 110).

The absence of a *felt* wrongness or discomfort with regard to the crises of climate change and resource exhaustion may therefore contribute significantly to our difficulties. There seems to be nothing wrong with the environment as we see it in the front of our eyes, especially for those of us living in developed countries (extreme meteorological phenomena notwithstanding), and resources seem still plentiful. Therefore, we feel no immediate need to assess the worth of the scientific theories that are being advanced on these matters; even less so, if journalists and politicians assure us everything is fine, and the media keeps our attention occupied with trivial matters.

In this context, if one feels uncomfortable regarding climate change or the state of the environment, he or she may be inclined to dismiss the feeling as unimportant;

this goes against John Dewey's statement that it is "a mistake to suppose that a situation is doubtful only in a 'subjective' sense" (1938/1986, p. 110). Other causes for this lack of feeling are probably the material abundance that many still enjoy in developed countries, the omnipresence of consumerism, the low priority given to environmental news in the mainstream media, and our detachment from nature.

In the light of these arguments, I find that the analysis of our current response, as a civilization, to the challenges posed by climate change and resource exhaustion using the framework of John Dewey's pattern of inquiry *cannot be taken any further.* It may seem disappointing that I cannot continue the analysis of one of the most important themes of this thesis in the light of the pattern of inquiry; however, John Dewey explains that

> organic interaction becomes inquiry when *existential consequences are anticipated* [italics added]; when environing conditions are examined with reference to their potentialities; and when responsive activities are selected and ordered with reference to actualization of some of the potentialities, rather than others, in a final existential situation. (Dewey, 1938/1986, p. 111)

I have argued that we fail to anticipate the consequences of our actions, and in the light of those arguments, as well as John Dewey's statements above, I think that my decision of not pursuing the analysis of this theme is justified.

This conclusion is not calling into question the use of the pattern of inquiry to analyze what could be done about climate change in the future—it only reflects the total inadequacy of our current reaction to it. The climate change crisis splits people in two camps: a smaller one representing the scientific community, which is increasingly

alarmed by the degradation of many ecosystems and the increasing threats posed by climate change, and increasingly frustrated by the lack of adequate responses from governments;[39] and a much larger one represented by the general public, which remains mostly indifferent and unengaged with these matters, in spite of their crucial importance.[40] The conclusions of scientific studies are largely disregarded, and their recommendations are not followed; this is an enormous waste of resources, which is quite surprising in a world obsessed with efficiency and cost savings. We spend very large amounts of money on complex research projects,[41] and after they are completed we disregard their conclusions.

From the point of view of my work, I will continue to use John Dewey's pattern of inquiry for an analysis of the remaining themes: what I can contribute to community resilience education, as well as the process of developing this thesis. I think both can be meaningfully formulated (up to a certain point) using John Dewey's pattern of inquiry, and I will do this in the following sections. The indeterminate situation applies to my work in the sense that my investigation into the issues of climate change and resource exhaustion began with a felt discomfort that started to develop as I read some of the work of Homer-Dixon.

Institution of a Problem

Such a feeling of uncertainty and discomfort initiates the process of inquiry and constitutes its foundation; it further leads to a partial conceptualization of the unsettled situation by instituting a problem. Bernstein (1966) provides an apt formulation of how an inquirer progresses through this transition: "We are aware that something is wrong, troublesome, or conflicting, but we have not yet articulated the problem or problems to

be confronted" (p. 104). In Dewey's view, this process is prefigured by the dynamic interaction of the living organism with its environment: "It is only when the organism has 'hit' upon an adequate response, that coordination is achieved, that the organism 'knows' what the stimulus was" (Biesta & Burbules, 2003, p. 35); in a similar way, an inquirer moves "from an immediacy, an awareness of a difficulty, to the articulation and specification of the problems to be confronted" (Bernstein, p. 105). This formulation of a problem is yet very tentative, and its cognitive dimension is not well defined; however, the problem such formulated "represents the partial transformation by inquiry of a problematic situation into a determinate situation (Dewey, 1938/1986, p. 112).

As I mentioned, my inquiry began with a felt discomfort that started to develop as I read some of Homer-Dixon's work. This discomfort was accentuated as I read his more recent work (2008) and as I expanded my readings to other authors in preparation for this thesis. I defined, "instituted," the problem underlying my discomfort as the threat of being faced with a very challenging future due to a lack of understanding of scientific theories and a lack of public awareness regarding the potential damaging consequences of our actions. This definition of the problem was proven accurate by the further development of my inquiry; I find this significant in the light of John Dewey's remarks that "it is a familiar and significant saying that a problem well put is half-solved. To find out *what* the problem and problems are which a problematic situation presents to be inquired into, is to be well along in inquiry" (1938/1986, p. 112).

Defining the problem in this manner is also relevant for my future contribution to finding solutions to these problems; my future educational effort will try to address the lack of understanding of scientific theories and will try to engage communities in meaningful inquiries and actions. However, as it will be shown below, some of my further thoughts regarding possible educational interventions were mistaken and needed to be redefined. This flexibility indicates that the pattern of inquiry is a powerful tool that can help communities become better prepared to deal with the challenges ahead.

The Determination of a Problem-Solution

The correct or more accurate formulation of a problem continues the process of transformation of an indeterminate situation into a determinate one. This process is gradual: "After provisionally defining the problem, inquiry proceeds by hypotheses that go beyond what is immediately felt and observed to something absent – a possible solution" (Hildebrand, 2008, p. 55). Here the pattern of inquiry is characterized by a developing interplay and mutual evolution between the cognitive thinking of the inquirer (his or her ideas) and the objective aspects of the situation, which can be observed or measured (facts). This indicates that the inquiry has progressed significantly: "The cases in which a problem and its probable solution flash upon an inquirer are cases where much prior ingestion and digestion have occurred" (Dewey, 1938/1986, p. 112). However, the probable solution should still be treated as a suggestion without logical status (Dewey, p. 114) and needs to be further evaluated: "The suggestion *becomes an idea* [italics added] when it is examined with reference to

its functional fitness; its capacity as a means of resolving the given situation" (Dewey, p. 114).

I will now illustrate how my initiative for community education and action as well as the process of developing this thesis can be formulated in the light of this heading of John Dewey's pattern of inquiry. The solution I am proposing with regard to community education and action is targeting smaller communities with the purpose of making them more resilient. While technological solutions[42] can play an important role in dealing with the consequences of climate change and resource exhaustion, the future role of communities cannot be overstated. I did not start my thesis work from a perspective of stewardship and participative community, but I ended with the conclusion that this is where we should concentrate our efforts,[43] because the society is not likely to change from the top[44] and individual initiatives do not have enough strength.[45]

In this context I attempted to find out if there are in Canada any other community-based initiatives that have the purpose of addressing the challenges of climate change and resource exhaustion. I found only one initiative in British Columbia; it uses however a top-down strategy (K. McClelland, personal communication, August 24, 2011). The BC provincial government (which has established a legally binding obligation for BC to reduce its greenhouse gas emissions) and BC Hydro have joined forces to promote the involvement of NGOs in sustainability initiatives, and their effort is already showing results.[46] Nonprofit organizations and also some businesses whose owners are environmentally oriented are now participating in sustainability projects; they benefit from collaborating with

one another and from getting support from the provincial government and the media (P. Nagpal, personal communication, May 25, 2011). I found out about this initiative after having formulated my intention to target my educational efforts at smaller communities; the existence of such an initiative confirms that my formulation of this "problem-solution" is justified.

With regard to the process of developing this thesis, I thought initially that my best contribution to the problems of climate change and resource exhaustion could be the development of a few courses to be included in the Adult Education Certificate Program, which at the present time is commonly offered in colleges across Ontario. I thought also about developing an independent ecological responsibility program for colleges, but I ended by deciding against it; while an ecological responsibility program could offer more courses, it has a major disadvantage: It provides the eventual graduates with very few qualifications needed to enter the job market. Such a program could still be offered as a series of general interest courses, but this option has the potential disadvantage of lower enrolment; also, in a general interest course the registrants do not expect to have major textbooks or assignments, and usually the only evaluative mention for such a course is a satisfactory or unsatisfactory completion.

On the other hand, adult education certificate programs provide "train the trainer" courses destined to enable adult teachers or trainers to acquire sound pedagogical knowledge. These programs offer core courses in curriculum, instructional strategies, evaluation, characteristics of adult learners, and also a series of electives that can appeal to different learners based on their individual objectives. Offering ecological responsibility courses as a part of an adult education certificate

program has several potential advantages: It could provide significant dissemination given the relatively high number of registrants; based on my experience it is common to have 12–15 new registrants each semester. It also enables the instructor to provide more substantial learning opportunities, accompanied by textbooks and evaluation, because the courses are a part of a certificate program.

The students are going to acquire a qualification that is going to help their career advancement; and in their turn they are going to teach other adults, who are going to be able to further disseminate the ecological responsibility knowledge and attitudes. Last but not least, I thought the above arguments would be likely to convince the decision makers in colleges to bring a curriculum change to their adult education certificate programs as a part of the commitment of their colleges to a greener future.

I undertook the development of these courses as far as designing a raw curriculum, specifying the required textbooks and sketching the evaluation methods. However, I also became aware of the fact that what I perceived as advantages in this approach could be "disadvantages in disguise." I had probably correctly identified that my prospective students were going to acquire a qualification that was going to help their career advancement, and this is probably the most important requirement in a college program. However, while using this "platform" as a means of promoting my message could have helped it gain visibility, it is likely that my message would have needed significant adjustments to suit this arrangement, and I have considered such adjustments unsuitable for my purposes.

College education has a strong emphasis on job readiness and/or career advancement, and for this reason sustainability initiatives undertaken in colleges have

a strong business component. I have argued already that decisions on sustainability should not be taken by corporations because sustainability is too important to subordinate it to business criteria. We need to question the direction in which we are headed as a society, and I think such questioning is incongruous with a business environment. My message would need to be formulated differently if I place the emphasis on the positive aspects of dealing with climate change or if I place it on the urgency to action.

Focusing on the positive aspects of dealing with climate change (which is consistent with a business approach) has the advantage of engaging the learners in a positive way, but also the likely disadvantage of complacency; focusing on the positive carries the subliminal message that what we are currently doing in order to deal with climate change is working; in my opinion, what we are currently doing is a humble beginning, but it is not enough by far. Recycling, composting, using energy-efficient bulbs, and other similar measures are important, but they are not going to be enough to help us avoid the worst effects of climate change.

They do not change several important facts: that effective measures against climate change are "heroic objectives" which dwarf any of the actions we have taken so far (Morton, 2008, p. 380); that we are currently consuming the resources of 1.5 planets Earth; that the CO_2 concentration in the atmosphere is 100 ppm higher than it has ever been in almost half a million years; that it is now impossible to avoid a warming of the climate by 2°C or more;[47] that the oceans are acidifying; that the rate of species extinction is *100 to 1,000 times higher* than normal; and that many of the systemic changes anticipated as consequences of global warming, such as extreme

weather events, droughts *and* floods, failed crops, pests, and wildfires have already appeared and are intensifying (McKibben, 2011). I think W. Rees (2009) is correctly stating that the steps that we have taken are minor, but they can mislead us by giving us the wrong impression that we are on the right track (Rees, pp. 304–305). We are *not* on the right track.

I think these facts, unpleasant as they are, will need to take the forefront of my educational message. Taking such an approach has the advantage of focusing on what is most important, but possibly the disadvantage of discouragement. I will try to deal with this disadvantage by concentrating not on the enormity of the tasks ahead but on the urgency for action. Every delay makes our tasks more difficult in two ways: The time that is still available for taking action is shrinking, and the conditions that we will have to deal with are worsening. If we are going to be successful in changing the way we live, the road ahead is steep, and every delay is making it even steeper, so therefore we need to take action *now*. This is as positive as I can be while still remaining truthful to the conclusions of my research. If such an approach is cause for concern, then such a concern should, in the light of John Dewey's theory, be a spur toward inquiry.

These are the reasons which made me come to the conclusion that my educational message is more appropriate for a community initiative than for college teaching;[48] the discussion regarding the process of developing this thesis will need to come to a close here. As I mentioned already, in the conclusion of this thesis I will discuss briefly the future development of my initiative for increasing community resilience.

Reasoning

The cognitive aspects of inquiry become more refined as a consequence of the relationships that continue to develop between ideas and observed facts. Ideas interact with one another in a similar manner; accepting an idea (a possible solution) at face value leads to ungrounded conclusions: "When a suggested meaning is immediately accepted, inquiry is cut short. Hence the conclusion reached is not grounded, even if it happens to be correct" (Dewey, 1938/1986, p. 115). Ideas need to be examined in terms of their relationships with one another to determine which idea will impose itself as the most relevant to solving the problem. Any such idea needs to direct activities which can provide evidence leading to its acceptance or rejection. For this reason theoretical thinking cannot by itself be sufficient for inquiry: "Dewey's analysis of the process of inquiry as the cooperation of existential and conceptual operations clearly shows that it is precisely because of this *cooperation* [italics added] that inquiry has both an 'actual' and a 'conceptual' outcome" (Biesta & Burbules, 2003, p. 66).

The cognitive and factual aspects of inquiry inform each other and are both essential in order to learn as well as to obtain the "unified whole" of the determined existential situation (Dewey, 1938/1986, p. 108). This is an important aspect of inquiry: "Without reasoning or thinking, our problem solving remains haphazard and unintelligent. Existential operations are indispensable, not only to bring about a unified situation but also in order to find out the value and worth of our ideas" (Biesta & Burbules, 2003, p. 66).

With regard to the process of developing this thesis, I have illustrated its evolution using the theoretical framework of the first two headings of the pattern of

inquiry, and I explained the adjustments that needed to be done under the third heading; however, from now on the factual aspects will be missing, and this is why I cannot continue the analysis of this theme. I will continue the discussion on reasoning, the operational character of fact-meanings and common sense and scientific inquiry using the example of a community that is already engaged in implementing a resilience project.

Since all the headings of the pattern of inquiry have been mentioned in the above paragraph, I need to mention that they are not to be interpreted as "stages" and that the inquirer does not need to advance rigidly from one to the next. This would mean treating inquiry too uniformly, something that was not intended by Dewey (J. Novak, personal communication, August 28, 2011). The indeterminate situation is characterized as having a precognitive character, and the operational character of facts-meanings applies throughout the whole pattern of inquiry (with the exception of the indeterminate situation). The heading of common sense and scientific inquiry draws the distinction between specific inquiries whose main purpose is to improve certain aspects of life of a given community and more general inquiries whose main purpose is to obtain knowledge. It would therefore be a mistake to treat any of these three headings as "stages."

The institution of a problem, determination of a problem-solution, and reasoning could be regarded as "stages" of the pattern of inquiry, but only very approximately. On the one hand, inquiry can often reach logically warranted conclusions very quickly: "In many familiar situations, the meaning that is most relevant has been settled because of the eventuations of experiments in prior cases so

that it is applicable almost immediately upon its occurrence" (Dewey, 1938/1986, p. 116). On the other hand, complex inquiries may require several iterations of observations and interpretations which cannot fit in a mechanically defined order:

> When the problematic situation is such as to require extensive inquiries to effect its resolution, a *series* [italics added] of interactions intervenes. Some observed facts point to an idea that stands for a possible solution. This idea evokes more observations. Some of the newly observed facts link up with those previously observed and are such as to rule out other observed things with respect to their evidential function. (Dewey, p. 117)

The "fundamental thesis" of John Dewey's *Logic* is that "logical forms accrue *to subject-matter* [italics added] when the latter is subjected to controlled inquiry" (Dewey, 1938/1986, p. 105). This occurs as an effect of the reorganization of the elements of the original situation into a coherent whole, and in my opinion this process is essential for the development of solutions that will promote community resilience. The fact that *subject-matter* is enriched by logical forms implies that the respective subject-matter becomes more fit to exercise the function for which it is intended. In order to illustrate this idea, let us consider a modern (say 2010 or 2011) product, such as a car or an iPhone. Either one can be used as an example of an "intelligent" product that responds very well to the expectations of its user. It can be argued that such qualities are developed as a result of the interplay between facts and ideas that resulted in the mutual refinement of both.

It may seem questionable that the example of an industrial product is used in the search of solutions for the current environmental crisis. Such a contradiction is

only apparent. The pattern of inquiry is a *tool* that can deliver warranted solutions through a repetitive (if needed) process in which proposed solutions are defined, implemented, tested, and refined. From a strictly practical point of view, it is indifferent if we apply the pattern of inquiry to refine an industrial product or to search for a solution to an environmental problem. Moreover, the aim of inquiry is also a legitimate area of inquiry.

It has been argued that from an educational perspective the holistic philosophy is the most promising in leading to solutions to our current problems because it "incorporates intuitive and metaphorical modes of knowing into the above logical/analytic conception of the cognitive and introduces a *spiritual* dimension to the educational experience which addresses the . . . search for meaningfulness and purpose in the world" (Hutchison, 1998, p. 57). This is not meant to exclude "significant aspects of both the technocratic and progressive philosophies" but rather to integrate them "into a holistic vision for education" (Hutchison, pp. 57–58).

What I find most valuable here is the aspect of inclusiveness: Any perspective proven to contribute to a solution needs to be considered. However, if I would need to place my vision under one domain, I think I would choose "science" over "holism." I am uncomfortable with any doctrine having an overarching character because of its potentially unquestioned nature and because, as I already mentioned, we ended up in our current situation due to an unwarranted acceptance of the capitalist paradigm and the cultural values associated with it; I may suffer from a similar "antioverarching" bias with regard to the holistic perspective. What appeals to me with regard to the authority of science is the following:

> It prevails solely by its intrinsic appeal to reason. It is, moreover, a piecemeal and partial authority; it does not . . . lay down a complete system, covering human morality, human hopes, and the past and future history of the universe. It pronounces only on whatever, at the time, appears to have been scientifically ascertained, which is a small island in an ocean of nescience. (Russell, 2005, p. 454)

I think adopting such a mindset would be more helpful for avoiding the mistakes of the past than reaching for (yet another) overarching system of meaning. The practical implication of the application of the pattern of inquiry for the effort of increasing community resilience is that viable alternatives to our current unsustainable practices need to be developed through a long-term effort of communities, an effort that starts with a felt concern about their future, formulates a (some) problem(s), examines and chooses alternative solutions, and then works toward the refinement of those solutions that are best fitted to solve the problem(s). This is a gradual process that will take time and effort to develop, but at the same time it will offer a sound alternative, something that is likely to work well and can give the community the confidence that it has reached a warranted solution. Another important aspect is that the process of developing such a solution would have taken the form of a democratic process and would have also contributed to the development of trust and good relationships between the members of the community.

The Operational Character of Facts-Meanings

The operational character of facts-meanings analyzes the close interaction of the "observed facts" and the "ideational content" of inquiry, which "are related to each

other, as, respectively, a clarification of the problem involved and the proposal of some possible solution" (Dewey, 1938/1986, p. 116). Their *operational* character makes their interaction possible because otherwise, since one constitutes an existential aspect of the situation and the other a nonexistential aspect, they could not interact (Dewey, p. 116). Dewey describes the operational character of *ideas* as follows: "They instigate and direct further operations of observation; they are proposals and plans for acting upon existing conditions to bring new facts to light and to organize all the selected facts into a coherent whole" (Dewey, p. 116). In the light of our discussion regarding community resilience, these statements illustrate how ideas can contribute to defining different alternatives, choosing the ones more suitable to resolve the situation and integrating them into a unified community approach.

On the other hand, the operational character of *facts* means that they are selected and arranged with the purpose of stating the problem in such a way as to extract meanings that can lead to its resolution. The facts that satisfy this criterion are kept and those that are not are dropped (Dewey, 1938/1986, p. 116). In this way the community will obtain a trustworthy solution that would have proven, at least partially, its effectiveness in dealing with future challenges. Such solutions will also prove the "operative force" of facts "in resolution of the problematic situation" (Dewey, p. 117); this process is closely related to experiment and therefore to the scientific method: "Naming them 'operational' is but a theoretical recognition of what is involved when inquiry satisfies the conditions imposed by the necessity for experiment" (Dewey, p. 117).

This discussion regarding the operational character of facts-meanings leads to the conclusion that the development and implementation of a complex community resilience project is a gradual process that requires a significant long-term commitment from community members and other stakeholders.

Common Sense and Scientific Inquiry

John Dewey states that the distinction between common-sense inquiries and scientific inquiries is to be found "in their respective subject-matters, not in their basic logical forms and relations" (1938/1986, p. 118). Common-sense problems and inquiries involve the establishment of "objects of use and enjoyment." The symbols used in such inquiries are constituted in practical systems rather than intellectual ones (Dewey, p. 118). On the other hand, in scientific inquiry "*relations* become the objects of inquiry and qualities are relegated to a secondary status" (Dewey, p. 119); as a consequence the semantic coherence of the relations, expressed by propositions, becomes essential (Dewey, p. 119). The subject-matter of scientific inquiry becomes therefore abstract and general: "The generality of *all* scientific subject-matter as such means that it is freed from restriction to conditions which present themselves at particular times and places" (Dewey, p. 120).

It is questionable to me whether scientific inquiry in the Deweyan sense will be as common in the postcarbon era as it is today. My focus on smaller communities implies that the "conditions which present themselves at particular times and places" will play an important role in future inquiries (Dewey, 1938/1986, p. 120). Information exchanges between communities far away from one another are conceivable, should the current communication technologies remain operational in the second part of the

21st century.[49] In this case, more general conclusions, applicable to a variety of resilience projects, could be formulated. Potential areas in which communities could share similar experiences could be related to food supply or to preparedness to the impact of natural hazards; such hazards have shown a marked rise both in frequency and intensity after the 1970s (Séguin, 2008, p. 402), and many communities will be confronted with them in the future. However, from the point of view of the solutions advanced in this thesis, the emphasis will be on common-sense inquiries. It is worth mentioning again that the "basic logical forms and relations" are the same for both common-sense and scientific inquiries (Dewey, p. 118).

Russell has seen in John Dewey's pattern of inquiry a potential for enhancing human hubris due to what he perceived as relativism introduced in the notions of truth and knowledge (Russell, 2005, p. 737). I see this criticism as unjustified; I have shown that Russell missed an essential component of Dewey's arguments—the felt unsettledness—when he considered the examples of the bricklayer and drill sergeant as adequate illustrations of the pattern of inquiry. I think the ideas of hubris enhancement and the perceived relativism introduced in the notions of truth and knowledge can also be criticized. If my understanding of Russell's arguments is correct, the pattern of inquiry could justify any "truth" the inquirer sets to work toward. This is not how the pattern of inquiry or John Dewey's philosophy in general should be interpreted:

> By "instrumentalism," Dewey never meant a narrow conception of the term as a way to create ideas to achieve narrow ends. Rather, for him it meant bringing intelligence to bear on the common events of everyday life and giving every

> citizen the tools to use his or her intelligence to best enhance meaningful experience. (N. W. Browne, 2007, p. 51)

My experience of writing this thesis offered me additional reasons to think that Russell's arguments are fallacious; I came to this conclusion in relation to an aspect that Russell has not addressed in his critique of Dewey's *Logic*: the importance of feelings in inquiry. As it will be shown below, I found that feelings and rational conclusions were both a part of my experience of analyzing environmental changes in the framework of the pattern of inquiry.

Hildebrand states that "inquiry is not a purely logical process – feeling is a useful and orienting presence throughout each phase" (2008, p. 57); Dewey also hints at the same fact in the following passage:

> The original indeterminate situation is not only "open" to inquiry, but it is open in the sense that its constituents do not hang together. The determinate situation on the other hand, *qua* outcome of inquiry, is a closed and, as it were, finished situation or "universe of experience." (1938/1986, p. 109)

I have mentioned that the indeterminate situation is accompanied by feelings of unsettledness or discomfort. On the other hand a "closed and, as it were, finished situation" (Dewey, 1938/1986, p. 109) could be expected to bring about a feeling of closure. I can state that I experienced feelings of closure now that my inquiry is coming toward its end.

An aspect relevant here is that *a feeling of closure is value neutral*. You can experience a happy feeling of closure if you obtain a "dream job" after having pursued it for more than one year, or you can experience a sad feeling of closure if a relative

dies after a long illness. Such feelings are not subjective: "It is the *situation* that has these traits" (Dewey, 1938/1986, p. 109). Dewey refers in this last quotation to a doubtful feeling, but I think it can be applied to a feeling of closure as well.

One cannot predict the outcome of an inquiry in advance, and such an outcome cannot, in Dewey's view, be measured by its conformity to a "universal truth"; however, this does not mean that the outcome of inquiry is indeterminate. Since its outcome is determinate, I do not think that the pattern of inquiry introduces relativism in the notions of truth and knowledge. A similar thought is expressed by Levi (2010):

> Dewey and Peirce shared a common focus on the elaboration of a model of inquiry that seeks to *remove doubt* [italics added] concerning the answer to some question by identifying potential answers to the question, ascertaining the evidence available for evaluating the candidacy of such answers as solutions to the problem posed, conducting experiments to acquire more evidence and deciding on the basis of the available evidence which of the potential answers to add to the stock of knowledge. (p. 80)

It should be clear that removing doubt, in the context of the above passage, is not a "mentalistic" operation but results following the rearrangement of the elements of the indeterminate situation and its transformation into a determinate situation. Such a process can happen on multiple planes: My conclusion following the research I have conducted for this thesis and its examination in the theoretical framework of John Dewey's pattern of inquiry is that the current environmental changes are the expression of a *desperate* situation and that the need for action is urgent; I consider this conclusion provisionally warranted in the Deweyan sense.

I do not have any specific answers on how we should deal globally with this situation. In the lights of my arguments from Chapter Four, the forces favouring the current status quo have critical mass and seem unable to understand that continuing on the current path will lead to a major catastrophe due to the combined effects of climate change and resource exhaustion. I believe a crisis is inevitable. If however, this crisis is not going to be complete and *if* before the crisis smaller communities will have an opportunity to develop and test alternative solutions from which to develop their specific answers to the challenges they are going to be faced with, we can transform the crisis into an opportunity for renewal.

Limitations

We will be able do so only if we take action urgently, and this requirement is going to be embedded in the mission of my nonprofit educational organization. I am aware that having defined this mission is a limited achievement. However, it now exists provisionally as an "object" that has been obtained as an outcome of inquiry, and it can serve as means for attaining knowledge through future inquiries (Dewey, 1938/1986, p. 122). I will work hard to influence small communities to engage in inquiries that could help them find solutions for their future challenges.

Another limitation regards the fact that I was not able to apply the theoretical framework of the pattern of inquiry for a thorough examination of the themes I proposed at the beginning of the chapter. I was obliged to abandon the first one, regarding our current response, as a civilization, to the challenges posed by climate change and resource exhaustion at the very beginning of the process, and I carried the second one, regarding the process of developing this thesis and why I decided to

change my focus from educating for ecological responsibility to educating for community resilience, only up to "the determination of a problem-solution."

One could ask if my choice of using John Dewey's pattern of inquiry for the analysis of these themes was an appropriate choice; I think it was. The fact that I was not able to analyze the response of our civilization to the current environmental challenges is due to the fact that large segments of the public remain unconvinced of the reality of these changes, even though they have started to unfold; this leads to a lack of interest that compromises the preliminary condition for starting an inquiry. This is not a weakness of the pattern of inquiry; it only brings additional proof to the complete inadequacy of our preparation for these challenges. Scientists have researched these environmental changes for a long time, and they have reached sound conclusions; however their efforts to mobilize political decision makers and the public have failed.

The second theme, regarding the process of development of this thesis, has been pursued as much as possible, and it appears to me that the "determination of the problem-solution" has led me to the meaningful conclusion that I need to concentrate my efforts on educating smaller communities. This is an important, though preliminary conclusion, because it helps me define a clear focus for my future efforts. Until now, my involvement with issues concerning environmental changes has been limited to educating (and debating with) a close entourage consisting mainly of family and friends, to participating (including brief interventions) at conferences and public events, and, on one occasion, to replying to what I considered was an instance of misinforming the public with regard to environmental changes (Gardner, 2010).

However, my nonprofit educational organization has not been founded yet, and I will be able to pursue my inquiry further only after that happens. The pattern of inquiry can help an inquirer reach warranted conclusions only when it is applied in practice, and I am looking forward to doing this.

Conclusion

John Dewey states that "philosophical conceptions have . . . outlived their usefulness considered as stimulants to emotion, or as a species of sanctions; and a larger, more fruitful and more valuable career awaits them considered as specifically experienced meanings" (1909/2005, p. 194). I think these statements illustrate Dewey's commitment to a philosophy that *makes a difference* by informing our actions and helping us live meaningfully. Dewey also thought that "nature's value, like the meaning of 'nature' itself, must be discovered through ongoing and cooperative inquiry" (Hildebrand, 2008, p. 210). Moreover, inquiry itself can be seen as "the intelligent restoration of equilibrium with the environment through a series of stages" (Zackariasson, 2007, p. 7). Inquiry can therefore serve as a tool that allows us to better understand nature and learn how to live in harmony with it. In our current situation, inquiry can also guide our collective engagement in a search for warranted solutions for adaptation and sustainability in the context of a changing nature.

Working on this thesis made me increasingly aware of the urgent actions required in the context of the current environmental crisis: We need to raise awareness about climate change and resource exhaustion, to facilitate the understanding of scientific facts, to counter the actions of climate change deniers, and to encourage communities to take responsibility for their future and to start planning what they can

do to improve their resilience in the postcarbon era. The circumstances in which I completed the thesis are also significant, because I started to write at a time that brought major personal changes: We welcomed a child into our family and we needed to relocate hundreds of kilometres away to a new home; in this context of change I was able to reorient my professional activity toward environmental education without too much additional disruption.

These circumstances were undoubtedly favourable for my current and (now) future work, but I am wondering if other people could consider similar changes in their lives as well. Our time is one of economic uncertainty, and this could, potentially, be an opportunity for increased environmental and community action. While the salaries offered in the nonprofit sector are usually below those paid for similar positions in the for-profit sector, one has the satisfaction of doing something that feels right; satisfaction is not dependent anymore on earnings and becomes intrinsic.

If money still remains a concern, maybe one can look in his or her community for additional help: sharing and borrowing objects and swapping tasks can help the members of a community live comfortable lives and enjoy free services that would otherwise cost significant amounts of money (Leonard, 2010, pp. 237–238). The feeling of belonging and the trustworthiness of the community are additional advantages: "We've got one another's backs. I know that I always have someone to call if I get a flat tire, if I need emergency childcare, if I'm hungry and too tired to cook" (Leonard, p. 239). Shared community life is, however, not enough to make communities more resilient because their members still depend on the current economic system in order to satisfy their needs (Leonard, p. 239).

How then are communities going to engage in meaningful inquiry to increase their resilience? I think there is no "one size fits all" answer to this question. Realizing the *absolute need* to do this is a necessary first step; defining short-term and long-term projects is probably the following step; it is not possible to move from dependence (on our current economic arrangements) to resilience without any transition. The concrete situations occurring in each community are very important in defining the details of any future actions. I find it impossible to substantiate theoretical recommendations considering that in the later phases of the pattern of inquiry we need both ideas *and* facts in order to test and refine any solution proposed.

Many books promoting sustainability practices and proposing solutions for the postcarbon era have been published recently. The advice they offer covers a wide range of topics: food/gardening, heating, energy, health care, water, money, transportation, safety, community involvement, and so on.[50] Raising these issues is useful because it contributes to increased awareness about the coming environmental challenges; however, I found many of the solutions proposed to be speculative. The risk of generic solutions is that they may prove inapplicable due to factors that are specific to each community and that are not taken into account. We will be dealing with complex situations in which details and the testing of solutions will be essential. There can be no shortcuts to the determination and hard work of communities to invest time and effort in their future.

I have mentioned the urgency to act and the absolute need to start inquiring into our transition to the postcarbon era; I have summarized the (few) concrete elements with which I am going to start my project of educating for community

resilience. My inquiry will advance further as concrete actions will unfold and my arguments regarding the pattern of inquiry should have proven that this is not an insufficiently defined plan of action. In my opinion one thing can be stated with near certainty: Intelligent preparation for the challenges ahead is our only option.

CHAPTER SIX: CONCLUSION

The intellectual function of trouble is to lead men to think. (John Dewey, 1931/2000).

In one of the stories written by Hans Christian Andersen the main character is an old oak. He was 365 years old, yet he felt full of strength and vigour. One day however, "as he still grew upwards and onwards, [he] felt that his roots were loosening themselves from the earth" (Andersen, 1884/1975, p. 22). The old tree was not worried; on the contrary, he was excited: "'It is right, it is best,' said the tree, 'no fetters hold me now. I can fly up to the very highest point in light and glory'" (Andersen, p. 22). At the same time, "a mighty storm came rushing over land and sea" (Andersen, p. 22); the old oak was torn out and died.

Summary

I have started this work from a rather hopeful perspective. My initial plan was to develop an ecological responsibility program for colleges, to be offered as a part of the Adult Education Certificate Program in order to promote knowledge, skills, and attitudes about ecological responsibility. I abandoned this idea primarily for what I perceived to be an incompatibility between the job readiness requirements of college education and the radical changes that are needed in order to avoid the worst consequences of climate change. My research also led me to conclude that our civilization fails to prepare adequately for the coming crises; while the political leaders remain committed to economic growth,[51] climate change deniers continue their disinformation campaigns.[52] The unequivocal message of the scientific community fails to reach a public largely apathetic on this matter, whose attention is dispersed

between individualistic concerns (mainly of an economic nature) and the "media barrage" of celebrity news and entertainment. In this context I believe that some form of social breakdown is unavoidable, and I therefore decided to change my focus from educating for ecological responsibility to educating for community resilience. I have addressed the criticisms that confront this point of view, and I have argued that John Dewey's pattern of inquiry is a powerful tool that can be used by smaller communities to improve their preparedness and become better equipped to face the coming crises.

Conclusion

Our story has not been written yet, and it is still in our power to influence its ending. I explored its different components with concern, and I often needed to pause to redefine how I understood them; it has been a fascinating journey, and I was able to share my involvement and passion with my family and some of my friends. A few people have very limited power, but if communities assume the responsibility of their future, start investigating what could increase their resilience, and start to implement the findings, their inquiries could yield viable alternatives to the disastrous path our civilization is on.

In the second part of the 20th century, humanity has loosened many constraints that in previous centuries set limits to our population growth, life expectancy, availability of food, and ability to travel. As a consequence, human population has exploded, people live much longer, and their quality of life has improved overall. These improvements have not benefited everyone equally; while more than one billion humans continue to suffer from hunger and poverty (Cribb, 2010, p. 168), many people in the developed countries have come to consider their affluence normal and

expect it to grow to new heights (Twenge & Campbell, 2009, pp. 230–238). Expecting to reach "the very highest point in light and glory," many of us have become oblivious to signs that indicate a "mighty storm" may be coming our way later this century.

We (and especially our children and grandchildren) risk having to pay a very high price for the conveniences offered by our technologically advanced society and for our intellectual inertia that entertains an unsubstantiated and irresponsible belief that all will be well. We disregard that the health and prosperity many of us enjoyed after World War II are *very atypical* in comparison with what people experienced in any other period in history and are largely based on nonrenewable fossil fuels. We became habituated to the good aspects of modern life, and now we expect them to endure indefinitely in spite of mounting scientific evidence that, save a very unlikely energy breakthrough, this is not possible. Our worldview raises the stakes for effective change impossibly high:

> The *new environmentalism* [italics added] must embrace a profound challenge to consumerism and commercialism and the lifestyles they offer, a healthy scepticism of growth-mania . . . a challenge to corporate dominance and a redefinition of the corporation and its goals, a commitment to deep change in both the functioning and the reach of the market, and a powerful assault on the anthropocentric and contempocentric values that currently dominate. (Speth, 2010, p. 7)

I fully agree with these statements; however, their scope is so large that no organization can hope to tackle them effectively. Many of us still enjoy the abundant lifestyles made possible by consumerism and accept uncritically the "necessity" for

economic growth. At the same time, I do not see a challenge to corporate dominance as able to succeed in the foreseeable future. In spite of the obvious failures of what I would call "the twilight of capitalism," the Western world leaders maintain the cap on the same measures centered on globalization and economic growth, and the emerging BRIC countries do not have an alternative model to offer. This is what I meant earlier by the "critical mass" acquired by the forces that sustain the status quo.

Like Midas, capitalists have had their prayers answered—they now have the ability to convert almost anything into wealth. Unlike Midas, they do not yet realize this ability is a curse in disguise; and, should they realize this, there is no god that could take it back. As twilight descends into night, we will need to accept the idea that, this time, there will be no daybreak—unless we create it.

Recommendations

The solution I propose is far from ideal;[53] abandoning the idea of widespread international co-operation that could bring effective action against climate change[54] may render questionable the usefulness of my approach. Smaller communities may not have the competence or resources that would allow them to preserve the scientific, technological, and cultural achievements that we enjoy today, and a long-term setback in these areas is probably unavoidable. To think that our great-grandchildren may lose many of the things we take today for granted is a chilling thought that I have a hard time entertaining, especially because they are going to be put in this situation as a consequence of *our* collective actions.

However, the lack of political will at a national and international scale *leaves no better option*; I will briefly elaborate on this statement: Theoretically, much better

alternatives still exist: "Mobilizing to save civilization means fundamentally restructuring the global economy in order to stabilize climate, eradicate poverty, stabilize population . . . and, above all, restore hope. *We have the technologies, economic instruments, and financial resources to do this* [italics added]" (Brown, 2009, p. 261). How about the costs of such an ambitious program? They are definitely affordable: "Combining social goods and earth restoration components" would only cost "13% of the global *military* [italics added] budget" (Brown, pp. 262–263). As Brown emphasizes: "It is decision time," and "the failure to act is a de facto decision to stay on the decline-and-collapse path" (Brown, pp. 264–265). It is sobering to note that we already stayed on the "decline-and-collapse path" for two more years after Brown's book was published and that we continue to do so.

In this context, enabling smaller communities to be more resilient could help us preserve and, later, be able to recover some of the achievements we are so proud of, because "a future in which we fail to address climate change includes death, disruption, extinction, and suffering on a massive scale" (Hoggan, 2009, p. 231). Avoiding such catastrophic consequences, even imperfectly, for individual communities, is therefore essential.

From a practical point of view, the strategies to be developed are going to be unique to each community, based on their strengths, weaknesses, and resources. A skeleton frame of action would include the following: developing awareness of the climate change and resource exhaustion crises, building acceptance, obtaining commitment from community leaders, strengthening potential vulnerabilities, and developing a community-based "Plan B." I will sketch a short theoretical discussion by

relating this skeleton frame of action to Mead's (1918) considerations on the stages of social service and by placing it in the theoretical framework of John Dewey's pattern of inquiry.

According to Mead (1918), the first stage of a social service initiative is "the stage of charity, in which those who are fostering the service feel that they are laying up good work for themselves. This stage is personal and sometimes sentimental" (Mead, as cited in Orbach, 2005, p. 24). Developing awareness of the climate change and resource exhaustion crises, building acceptance, and obtaining commitment from community leaders will fall under this stage. From the point of view of Dewey's pattern of inquiry, the indeterminate situation and institution of a problem are relevant here. From a practical point of view, it is going to be hard to convince community leaders to accept the scientific evidence regarding climate change and probably even harder to convince them they need to take action at a local level.[55]

The second stage of a social service initiative is defined by Mead (1918) as "an organized stage in which details are put into the hands of trained workers. An effort is made to counteract the evils of the earlier stage and its good points are sometimes overlooked" (Mead, as cited in Orbach, 2005, p. 24). I think some unsettledness is inevitable when a social service initiative transitions from an individual to an institutional level. In this case the transition may, however, be smoother because before reaching this stage, the commitment from the community leaders would have been secured. Strengthening potential vulnerabilities would then become an achievable goal. From the point of view of Dewey's pattern of inquiry, the determination of a problem-solution is most relevant. From a practical point of view, Mead's remark

about the "trained workers" may point to a potential difficulty: These efforts will lead the community in unchartered territory, so its members will become trained as they think and act together toward the common goal of building a more resilient society.

Mead (1918) defines the third and last stage of a social service initiative as "a stage of *experimental work* [italics added] which undertakes to determine what social changes must take place to get rid of the evils which charity only alleviates" (Mead, as cited in Orbach, 2005, p. 24). The experimental character of this stage matches very well with Dewey's description of reasoning, in which various ideas (potential solutions) are examined in the context of their interaction with one another and with the observed facts. In this context, developing a community-based "Plan B" will be an experimental problem-solving process that should not only improve the resilience of the community but also enhance its democratic practices.

Indeed, in Mead's (1918) words: "This stage takes the work as a problem for the community and various agencies unite to solve it" (Mead, as cited in Orbach, 2005, p. 24). One can hope that at this stage the initiative will start to show concrete results in terms of improved resilience and better community life. Should a partial breakdown of the social order occur elsewhere, the danger of falling prey to opportunistic or extremist leaders is much reduced because the community will have an alternative—a better way of life that would have already shown its advantages.

If a significant number of communities decide to become more resilient by adopting such a model we may, as a civilization, recover from the serious downturn that awaits us and be able to consider it, in retrospect, a lesson learned.

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Endnotes

Chapter Two

[1.] The working conditions seem to be often harsher in China than they are in Canada; one example comes from a conversation that I had with a Chinese supplier when almost all the parts they had produced needed to be scrapped; due to the extremely high rejection rate, we wanted to make sure they corrected their process before shipping any more parts. I therefore followed the usual emails with a phone call a few days later; I asked if they had solved their problems—and the answer was: "Yes, sir, everybody who made that mistake was punished."

[2.] I watched film footage of Mr. Anderson addressing a gathering of civic and business leaders at North Carolina State University (Achbar & Simpson, 2003); he started his address by saying: "Do I know you well enough to call you fellow plunderers?" He obviously meant this opening as a joke, but in the audience nobody laughed. His company may unfortunately be one of the very few to "climb Mount Sustainability" (Achbar & Simpson).

[3.] An economic optimist (defined roughly as someone who sees humankind as successful in the long term, through a combination of free markets, science, and democracy) would explain that economic growth leads to growths in population, total GDP, and foreign direct investment, and would argue that humans have never been better. Disregarding the dangers of economic growth is however extremely myopic and may lead our civilization to collapse. Just as a reminder, if we double the actual size of the economy, we will end up consuming 300% of the resources the earth has to offer; we could reach this stage later this century unless we change course.

[4] The financial meltdown of 2008 was the end result of the deregulation of the U.S. financial industry, which was initiated in the early 1980s by U.S. President Ronald Reagan and his administration. Several warnings of a potential meltdown were issued by top economists, but they were ignored (Ferguson, 2010). Greed, lack of regulation, collusion between industry leaders, ratings agencies, and political decision makers have in the end impoverished millions of people and threatened to throw the global financial system in a dangerous tailspin for the sake of a few individuals (highly placed in the U.S. financial industry) who made immense profits (Ferguson). Those responsible for this massive fraud remain (with minor exceptions) free of civil or criminal charges and were also able to keep the hundreds of millions of dollars they looted (Ferguson); I think this cynical outcome shows that by placing profits ahead of any consideration the capitalist system has slowly become inadequate of serving any interests except those of a very small and self-referential elite. Unfortunately, very similar factors influence the climate change crisis: "A small number of individuals with enormous political sway" (Hansen, 2009, p. 249) threaten the future of humanity for the sake of maintaining the profits of the fossil fuel industry. They largely control the political sphere (Hansen, 2009, p. 242), and in some situations they have interfered with the administration of justice (Hansen, p. 247; Powers, 2011) and with law enforcement (Hansen, pp. 244–245).

[5] It has been argued that economic growth has already reached its end due to the depletion of resources, environmental impacts, and unbearable levels of debt, private and public (Heinberg, 2011). At the time of writing, however, this argument was not accepted, and the decision makers of the Western world were still trying to

resuscitate the capitalist economic system in spite of its increasing difficulties (Heinberg).

[6.] As I mentioned, I often read electronic articles about climate change and the comments that pertain to them. For example, in December 2010 I read an article about the high prices of oil at that time (McNew, 2010), and I browsed some of the comments. One of them was mentioning the drawbacks and risks of switching to new forms of energy—batteries for example are made following a complex manufacturing process that uses large quantities of oil, and there is not enough clean electrical energy to fuel battery-powered cars. These points are valid, but they do not justify maintaining the status quo. I replied to the comment, and I asked if we can afford to run the economy on oil until we finish it and then switch to gasifying coal. When I checked the article again a few days later, I found that my reply carried a high score of disapprovals. This is not a unique situation—a majority of the replies to articles about climate change lean on the side of minimizing its importance and postponing action.

[7.] Not all celebrities are of this sort, and many utilize their resources for good purposes (K. McClelland, personal communication, August 24, 2011).

Chapter Three

[8.] The Alberta-based organization *Friends of Science* lists several "facts" as "proofs" that climate change is not happening: The earth is cooling; violent weather isn't getting worse; climate computer programs are proven wrong (Friends of Science, 2009).

[9.] James Lovelock considers that it is too late and too risky to try to reach any international consensus on climate change. He recommends that Britain acts alone, by securing sources of energy, preparing for the protection and eventual abandonment of cities close to sea level such as London and Liverpool, and "plan for the synthesis of food from nothing more than air, water and a few minerals" (Lovelock, 2006, p. 13).

[10.] William Shakespeare (1600/2004, p. 54), *As You Like It*, Act 2, lines 15–17.

[11.] About seven years ago I used to drive quite frequently from Milton to Oakville; just before entering Oakville, in a beautiful area, half a mile north from the Oakville marina, there was an odd-looking house, with its front lawn purposely made into a junk yard: it contrasted so sharply with the surroundings that one day when I had more time I decided to stop by and inquire what was the meaning of this odd arrangement. I rang the doorbell, and a kind, middle-aged gentleman opened the door. I soon found out that not only the front of the house but part of the main floor inside served a similar purpose. The walls were decorated with a large collection of paintings depicting, for lack of a better word, industrial landscapes. Here was this factory with its rectangular grey buildings and its huge smokestacks spewing dark clouds into the sky; beside it, there was another plant, featuring a close view of its wastewater pipes; further down the hallway, the painting of a metal press and its scrap chute; if none of

them was suiting the visitor's taste, how about the painting of a metal scrap yard? Or one of a plot of land full of barrels with chemicals?

All the works in the gallery were skilfully made oil paintings. Their craftsmanship was excellent, and yet I felt repulsed when I finished my tour; as my host explained, this was exactly his purpose. Our daily surroundings are mostly made of steel and concrete; we can often see smoke in the air, and if one bothers to notice, there are quite a few scrap yards and contaminated sites. Well, if this is the world we have created, then is it not hypocritical to hang on our walls beautiful landscapes or paintings of flowers or wildlife? And if we do not like the things we see around us, why do we take the easy way out and ignore them? Why don't we try to do something about them?

[12.] In its *treatment of uncertainty* the IPCC links the following terms to the probability of a certain outcome to occur (2007, p. 27):

Virtually certain:	99%
Extremely likely:	>95%
Very likely:	>90%
Likely:	>66%
More likely than not:	>50%
About as likely as not:	33% to 66%
Unlikely:	<33%
Very unlikely:	<10%
Extremely unlikely:	<5%
Exceptionally unlikely:	<1%

[13] It is not possible to form a conclusion based on what happened during a single event; however, two out of five interventions at the CMOS-CGU congress came from climate change deniers or doubters. Their actual numbers in the scientific community are much lower than 40%, but their high visibility suggests they are very determined to promote their cause.

[14] Sports, celebrities, and fashion almost invariably opened the "news," in spite of very important events that should have taken the first spot, such as an armed conflict in Libya, a downgrade of the U.S. credit rating, and a potential global recession. Here are some of the main titles: "Minor-leaguer's awe-inspiring homer"; "Inside Amy Winehouse's troubled life"; "Baseball star reveals his tattoo-piercing"; "Bieber, dad get matching tattoos"; "66-year-old actress wins 'Body of the Year'"; "Pitcher furious over unwritten rule breach"; "Hollywood's highest earning actors"; "The world's highest paid female athlete"; "Inside Will Smith's enormous mansion"; "Why these flip flops cost $18,000." Not all the news items were of this nature, but I found a large majority of them to be biased toward sensationalism and irrelevance.

[15] Canada has a crucial responsibility in this matter, quite apart from the catastrophic pollution of the Arctic due to the exploitation of tar sands. Hansen writes the following with regard to the oil pipeline that is being built to carry tar sands oil to the US: "Phase out of emissions from coal is itself an enormous challenge. However, if the tar sands are thrown into the mix it is essentially game over" (2011b, p. 1). According to Hansen: "The tar sands are estimated (e.g., see IPCC AR4 WG3 report) to contain at least 400 GtC (equivalent to about 200 ppm CO_2)" (Hansen, 2011b, p. 1).

[16.] The A1 scenario "is divided into three groups that describe alternative directions of technological change: fossil intensive (A1FI), non-fossil energy resources (A1T) and a balance across all sources (A1B)" (IPCC, 2007, p. 44). I am not examining them individually because I consider the likelihood of the A1 scenario low (as explained on pp. 96–97).

[17.] This temperature estimate probably needs to be revised. The IPCC AR4 was published in 2007 and shows the temperature increase for the A2 scenario as 3.4°C. The next scenario below is A1B, which shows an anticipated temperature increase of 2.8°C (IPCC, 2007, p. 45). Hansen published his work in 2009; while he does not offer an estimate for the A2 scenario, the temperature increase estimate for the A1B scenario is over 4°C (Hansen, 2009, p. 121).

[18.] Some of these positive feedbacks are also mentioned by Lynas (2007) in Table 1. They are the carbon cycle feedback that will reduce the capacity of land and ocean to absorb carbon dioxide (Hansen, 2009, p. 276), a significant methane release following the thaw of the frozen tundra (Lynas), and an even higher release of methane from the bottom of the oceans (Hansen, p. 276).

[19.] The major climatic modifications that Hansen fears will severely affect our conditions of life are the following: very frequent and severe storms (2009, p. 250), a sea level increase of 250 feet over a few centuries (p. 160), and temperature surges following the release of frozen methane hydrates from the bottom of the oceans (p. 276).

[20.] The concept of the "2°C guardrail" is seriously questioned by Hansen. He writes: "Specifically, the target to limit global warming to 2°C, rather than being a safe 'guardrail,' is actually a recipe for global climate disasters" (Hansen, 2011b, p. 1).

Chapter Four

[21] On August 29, 2011 James Hansen said the following in front of the White House:

> We had a dream – that the new President would understand the intergenerational injustice of human-made climate change – that he would recognize our duty to be caretakers of creation, of the land, of the life on our planet – and that he would give these matters the priority that our young people deserve.
>
> We had a dream – that the President would understand the commonality of solutions for energy security, national security and climate stability – and that he would exercise hands-on leadership, taking the matter to the public, avoiding backroom crippling deals with special interests.
>
> We had a dream – that the President would stand *as firm as Abraham Lincoln when he faced the great moral issue of slavery* [italics added] – and, like Franklin Roosevelt or Winston Churchill, he would speak with the public, enlisting their support and reassuring them.
>
> Perhaps our dreams were unrealistic. It is not easy to find an Abraham Lincoln or a Winston Churchill. But we will not give up. (2011a, p. 1)

[22] The book offers much information about earlier civilizations and their evolution as well as many details about their interactions with one another; however, some of this information is seriously inaccurate. The interpretation given by Ridley (2010) on what caused the fall of the Roman Empire offers a pertinent example. The main inaccuracies are the misinterpretation of the role played by Diocletian, who

reigned from 284 to 305 AD and the oversimplification of a process that was very complex, with causes that were "determined by the uneven effect of long-term and slow-growing changes" (Haley, 1969b, p. 538) to mainly one aspect, the decline of economic activity due to bureaucratic overload and excessive regulation.

[23.] Ridley (2010) considers the intensive raising of animals for meat consumption as being largely beneficial, for consumers as well as for the planet. He argues that the meat produced in these conditions is cheaper and that the animals are not able to generate extensive damage to the environment (for example through overgrazing). He concedes that the conditions in which the animals are obliged to live can lead to their distress, especially due to the lack of movement, but considers this is a small price to pay in comparison with the benefits obtained.

However, he disregards facts such as the extensive use of hormones and antibiotics and their detrimental effects on humans. The hormones interfere with the endocrine system of humans (the earlier and earlier onset of puberty in girls has been documented for many years), and the antibiotics lead to the appearance of antibiotic-resistant bacteria. None of these issues are mentioned by Ridley, although they are widely known.

[24.] Ridley presents big-box retailing from a perspective that focuses exclusively on positive aspects. What are missing from Ridley's (2010) arguments are the harmful effects of globalization, some of which were presented in the previous chapters (the overwhelming majority of the products offered by Wal-Mart are globally sourced). There is also no mention of the fact that several communities have fought back in order to protect their local economy and quality of life, and some were able to prevent

Wal-Mart from building a store in their city (Mitchell, 2006, p. 219). The billions saved by customers through big-box retailing are impressive at the first sight, but they are shared between an enormous number of people; overall, more money is lost through job losses than is gained through savings. Otherwise, the statistics should show a constant enlargement and enriching of America's middle class as a consequence to big-box retailing, but the evidence points in the opposite direction.

[25.] Ridley (2010) argues that genetic engineering can help create plants that are resistant to different pests or can grow in salty or contaminated soils and that GM plants can help alleviate hunger in the developing world. However, Ridley does not mention any of the potentially bad consequences of this technology. There are serious biological risks associated with the introduction of new GM crops, and these risks need to be assessed carefully in each case (Hartmann, 2009, pp. 18–21). There are also ethical concerns: GM plants are patented, and therefore the company that has produced them can impose its own conditions on their sale or further use. Moreover, many GM seeds have been engineered to produce only one crop; that is, the seeds obtained from the GM plants cannot germinate. This can hardly be seen as a measure that is meant to help eradicate hunger in poor countries.

[26.] Carr (2010) argues convincingly that it is impossible for computers to develop *human* thinking abilities. He explains that the incredibly complicated synaptic architecture of the brain is extremely hard to model; he also mentions that other factors, chemical, genetic, and evolutionary, are equally important and cannot be modeled in the binary logic of a computer due to their organic, evolutionary nature. It is the interplay of all these factors that defines human thinking, and any algorithm, no

matter how complex, will fall short of this unfathomable complexity (Carr, pp. 182–195).

However, Dawkins mentions the theoretical possibility of forms of life "not based on chemistry at all but on electronic reverberating circuits" (1989, p. 191); he considers that the DNA molecule, on which much of the biological evolution of our planet is based, may not be the only "replicating entity" in the universe: "There may be others. If there are, provided certain other conditions are met, they will almost inevitably tend to become the basis for an evolutionary process" (Dawkins, p. 192).

[27.] The Singularity University, based in San Francisco, focuses on in-depth studies on artificial intelligence and predicts that by the year 2045 artificial intelligence will surpass the brainpower equivalent of all human brains combined. The research conducted at this university is very interesting:

> Underlying the practical challenges are a host of philosophical ones. Suppose we did create a computer that talked and acted in a way that was indistinguishable from a human being. . . . Would that mean the computer was sentient, the way a human being is? Or would it just be an extremely sophisticated but essentially mechanical automaton without the mysterious spark of consciousness – a machine with no ghost in it? And how would we know? . . . If I can scan my consciousness into a computer, am I still me? . . . Who decides who gets to be immortal? Who draws the line between sentient and nonsentient? . . . By beating death, will we have lost our essential humanity? (Grossman, 2011, p. 48).

The researchers of the University also work "to make sure not just that artificial intelligence develops but also that the AI is friendly" (Grossman, 2011, p. 48). This seems a reasonable precaution, because "you don't have to be a superintelligent cyborg to understand that introducing a superior life-form into our own biosphere is a basic Darwinian error" (Grossman, p. 48). These ethical and practical concerns are very important, and I think they should be allowed to influence our decision-making process *now*, before this superintelligent AI is developed. I doubt however that the Singularity University would go as far as questioning the reasons for its own existence.

[28.] Bob Taylor criticizes the philosophy of John Dewey, which he perceives as promoting an anthropocentric view of the world, as well as "an instrumental view of nature, in which nature exists primarily for human exploitation" (McDonald, 2004, p. 57). These criticisms are refuted by McDonald, who argues that "on the whole, Taylor's criticisms are one-sided, that is, they stress one aspect of Dewey's voluminous output while ignoring the overwhelming balance" (p. 58).

[29.] An extremely interesting research found that humans deal with the anxiety of their (future) death by reinforcing their worldview (Volk, 2002, pp. 106–119); this is an unconscious process which can be manipulated for narrow purposes. On the other hand, it has been found that the fear of death reinforces *any* worldview, including those based on tolerance and understanding: "The tolerant can be more tolerant when faced with the awareness of death. The bigoted become more bigoted. It's a choice we need to think about" (Volk, p. 119).

[30.] The term "cultural change," as it is here understood, refers to accepting the fact that our worldview is inadequate and looking for ways to redefine it. This

redefinition is urgent and could be spurred by increased environmental awareness and effective social action. The term is not related to the type of cultural change envisioned by Bowers (1993) and discussed earlier in this chapter.

Chapter Five

[31.] The need for a major cultural change for our civilization was expressed around the end of World War II, and I think the challenges and promises associated with such a change have increased exponentially since then. Russell wrote:

> The most important effect of machine production on the imaginative picture of the world is an immense increase in the sense of human power. . . . The result is a diminution of fixity; no change seems impossible. *Nature is raw material; so is that part of the human race which does not effectively participate in government* [italics added]. . . . This whole outlook is new, and it is impossible to say how mankind will adapt itself to it. It has already produced immense cataclysms, and will no doubt produce others in the future. *To frame a philosophy capable of coping with men intoxicated with the prospect of almost unlimited power and also with the apathy of the powerless* [italics added] is the most pressing task of our time (2005, pp. 659–660).

Also, what makes the current situation unique in history is that human activity and its consequences have become planetary forces. The natural cycles of several chemical elements have been disturbed, and the rate of species extinction is hundreds of times bigger "than what could be considered natural" (Munro, 2009, p. A7). This makes many scientists think we are engaged on a risky and unpredictable path that "could lead to abrupt environmental changes" (Munro, p. A7).

[32.] The capitalist system has triumphed worldwide, but two ex-Communist countries, Russia and China, are increasing their influence in the world and are likely to also increase their mutual co-operation (Paskal, 2010, pp. 24–25). Which country

will be the most influential in the future is an open debate, but the pattern of domination and of "superiority" of some over others still endures.

[33.] The Arctic is the region most severely challenged by climate change. Polar bears are starving or drowning and will most likely become extinct in a few decades; the algae that develop underneath the ice are disappearing due to the disappearance of ice. The disappearance of algae threatens the very basis of the Arctic food chain, and, as a consequence, it threatens the *whole* Arctic ecosystem (Witten & Matsumoto, 2010). However, this potential environmental catastrophe fails to capture the attention of the public or the politicians in Nordic countries. Norway and Russia are seeing the changing climate as an opportunity to exploit new reserves of oil and gas, and they are both aggressively exploring the Arctic for resources (Witten & Matsumoto).

[34.] I think the goals set by Boyd (2010) are highly commendable. The list of people and organizations supporting the *2048* project is also impressive, yet they do not represent a dominant trend in public opinion, and I see them as unable to generate significant political will. While Boyd sets his priorities around advancing the implementation schedule of the International Bill of Rights, I see community education as the way to generate a shift in the public opinion (one community at a time). We first have to realize that our current path is leading us toward a dead end; this will likely create the need to search for viable alternatives and will help initiate meaningful inquiry.

[35.] For agriculture, oil is not providing only the energy required to power the machinery: "Fossil carbon is a prime ingredient of . . . artificial fertilizers. . . . If we run out of carbon or fail to find good substitutes, we are back to dung and muscle

power. Billions will die" (Homer-Dixon & Garrison, 2009, p. VIII). We are very much dependent on oil and gas for our food supply: We "have literally been eating oil and gas for more than a hundred years" (Homer-Dixon & Garrison, p. VIII); the reduced supply of oil and gas could mean a serious reduction in our food output.

[36.] Unfortunately no efforts are being deployed in this sense. Germany has recently announced it will shut down *all* its nuclear plants by 2022. This momentous decision has been taken for political reasons: "The decision comes after the growing anti-nuclear backlash globally following Japan's Fukushima disaster and after German Chancellor Angela Merkel's government lost ground to the Green party in recent state elections" (Ratner, 2011). I find it ironic that the Green party advocates shutting down nuclear plants, which produce abundant and reliable energy without generating greenhouse gases. There has been a 5% increase in greenhouse gas emissions in the last 2 years, in spite of a slow economic recovery (Francœur, 2011).

[37.] The flooding of New Orleans following hurricane Katrina or the 2005 Mumbai flood are relevant examples (Paskal, 2010, p. 245).

[38.] Let us imagine that we enter a room full of people that share a harmonious interaction with one another. We can probably state that the "existential conditions" are "determinate in and of themselves" (Dewey, 1938/1986, p. 110). However, as we enter the room, nobody greets us or even seems to notice our presence; it is quite likely that we will very soon start to feel uncomfortable. The situation has become indeterminate.

[39.] The 50th annual meeting of the Canadian Society of Zoologists was held in Ottawa, Ontario from May 16 to May 20, 2011. I attended an event open to the public

on May 18, 2011, and I listened to a conference on the subject of massive die-outs in bat colonies in several U.S. states and in New Brunswick, caused by a new fungal disease called the white nose syndrome. In spite of the seriousness of this situation, governments are failing to respond adequately (Fenton, 2011). The consequences of this illness could ripple through many ecosystems: A bat consumes each day insects weighing more than a third of its body weight, and many colonies count tens of thousands of individuals. It is also worth noting that wind turbines kill a significant number of bats; however the location of bat colonies is not taken into consideration when the development of new wind farms is being approved (Fenton).

[40.] As an example, the event mentioned in the above note was open to the public but was attended almost exclusively by scientists. I could count only four members of the public, myself included. I sent emails about this event to 25 families with young children (the event was open to children as well), but none attended.

[41.] The synthesis report generated by the IPCC in 2007 offers a prime example.

[42.] Some technological solutions that could help solve the energy/CO_2 crisis are the following:

(a) Carbon capture and storage (CCS). This method consists in capturing CO_2 from industrial sources (such as coal-burning electrical plants) and pumping it underneath the crust of the earth, in deep geological formations or in mature oil reservoirs. The method is effective in avoiding the release of CO_2 into the atmosphere, although it is not known if the CO_2 stored underground will remain safely there for the long term. The high costs associated to this method are also an obstacle to its widespread implementation.

(b) The energy efficiency of pebble bed nuclear reactors is on average 15% higher than the energy efficiency of the nuclear reactors currently in use. Pebble bed reactors are also *safe* from the point of view of reactivity accidents as well as loss-of-coolant accidents. In the US, pebble bed nuclear reactors cannot be built due to deficient legislation (Muller, 2008, pp. 168–170).

(c) Using U_{238} instead of U_{235} in "Generation IV" nuclear reactors would not only allow access to a much more abundant resource—the proportion of the two isotopes in nature is 99.27% to 0.72% (Nenițescu, 1972, p. 1160) but would also solve most of the challenges posed by storing nuclear waste—the existing nuclear waste could be used as fuel (Gates, 2010); this will ensure the supply for "*all our fuel needs for about a thousand years*" [italics added] (Hansen, 2009, p. 201). These reactors have a fuel efficiency 100 times better than the current reactors and pose very low safety risks (Hansen, p. 198). Ironically, the US had a unique opportunity to develop this technology several years ago: In 1994 top nuclear experts from the Argonne National Laboratory were ready to build a Generation IV test reactor, but the Clinton–Gore administration decided to cancel the program for political reasons (Hansen, pp. 199–200). Now, the technology may not be available commercially until 2030 (Hamilton, 2010, p. 267).

(d) An even more promising avenue seems to be the use of thorium salts as fuel for nuclear reactors. Thorium is a highly concentrated source of energy in comparison with uranium (it gives much more energy for the same mass of fuel); thorium *cannot* be used for the production of nuclear weapons, and thorium reactors are very safe. Thorium reactors offer other significant advantages, such as low fuel price, low capital

cost, long life, and low-cost maintenance. Considering these advantages, one may ask why thorium reactors are not already widely used: It appears that the reactors built after World War II used uranium and not thorium *because* they were offering the option of using some of the by-products for the production of nuclear weapons. Moreover, today there is a high stream of revenue generated from nuclear fuel for uranium reactors, and this revenue would be lost if there is a switch to thorium reactors. It is possible that China can envision a switch from uranium to thorium reactors because of its more autocratic government and the inability of industrial lobbyists to promote their interests in China as effectively as they do it in the West (Orlowski, 2011).

[43.] I am aware that such an approach needs to be inclusive: "Capacity-building does not begin and end with NGOs, or with donors. Nor is 'civil society' independent of . . . the state. Rather, capacity-building involves the whole network of relationships in society" (Eade, as cited in Allen, 2006, p. 90).

[44.] A most notable exception is the fall of the Soviet Union. We need however to take into account that the Soviet system was monolithic and therefore much more susceptible to submit to the will of one person (who happened to be a reformer) than are the governments and populations of Western countries. Moreover, Gorbachev intended to reform the Soviet Union and not to dismantle it; he was able (for a while) to restrain the Communist reactionaries, while being "genuinely confused and torn" about the future of his country (Treisman, 2011, p. 191).

[45.] Such a statement may appear questionable considering how fast ideas starting from only one individual can be disseminated using modern media. However,

several factors make it unlikely that a solution proposed by one individual could spread "like wildfire" and change the world: the problems to be solved are very complex, and their application is different from one community to another; the large public is generally unengaged; many governments and major corporations are reluctant to implement changes.

[46.] I find this initiative remarkable because the importance of community resilience is being recognized by the provincial government and a leading corporation such as BC Hydro. NGOs that promote sustainability and resilience initiatives can qualify for either short-term or long-term funding from BC Hydro (P. Nagpal, personal communication, May 25, 2011). British Columbia is the only Canadian jurisdiction that has adopted a carbon tax. I find it worthwhile to mention Hansen's comments on this issue:

> In February 2008, British Columbia decided to adopt a carbon tax with an equal reduction of payroll taxes. Five months later it was in place and working. This year [2009] there was an election in British Columbia in which the opposition party campaigned hard against the carbon tax. They lost. The public liked the carbon tax with a payroll tax reduction. Now both parties support it. In contrast, it took a decade to negotiate the cap-and-trade Kyoto Protocol, and many countries had to be individually bribed with concessions (2009, p. 218).

[47.] According to some of the latest scientific data, a warming of *4°C or more* is now anticipated (Melbourne Sustainable Society Institute, Melbourne Energy Institute, & Monash University Sustainability Institute, 2011).

[48.] I am aware of initiatives that aim to increase the role community colleges will play in the new postcarbon economy; one of them, the American Graduation Initiative (AGI), was started in July 2009; I was not able to find evaluations of its impact. I am wondering though if statements such as the following are realistic: "Focused on a declining industrial base and the need to re-educate the American workforce, AGI is intended to . . . prepare students for new employment in *well-paying* [italics added], community-based jobs (Lee Wood, 2010, p. 420). We seem unable to abandon the belief that our current prosperity will endure no matter what.

[49.] These technologies have revolutionized many domains of modern life, and they perform their functions very well because the equipment is constantly maintained and upgraded. Computer and communication equipment require high-tech knowledge and facilities and a highly specialized workforce for their manufacturing and installation. The materials and technologies used cannot exist as a separate domain, because they assume the availability of metals, plastics, vacuum chambers, microscopes, and so on, which in their turn are obtained through the collaboration of many industries. If a breakdown and consequent redefinition of our social life around smaller communities happen later this century, I think that very few communities will be able to preserve the knowledge and maintain the facilities required to manufacture computer and communication equipment.

[50.] Here are few examples of such books: Hopkins (2008), Suzuki & Boyd (2008), MacKay (2009), Mather (2009), Rogat Loeb (1999).

Chapter Six

[51] Not only the economic growth model is inherently unstable (Homer-Dixon, 2008, p. 200), but "our mismanaged world economy today has many of the characteristics of a Ponzi scheme" (Brown, 2009, p. 14). This makes future collapse all but certain, due to economic factors as well as to the depletion of resources (Brown, pp. 14–15).

[52] This is a deliberate campaign that constitutes "a story of betrayal, a story of selfishness, greed and irresponsibility on an epic scale" (Hoggan, 2009, p. 1). Hansen has even advanced the idea of criminally charging fossil fuel companies CEOs for their actions on the environment: "CEOs of fossil energy companies know what they are doing and are aware of the long-term consequences of continued business-as-usual" and "should be tried for high crimes against humanity and nature" (Hansen, 2008). However, I do not believe such a trial is to be expected soon.

[53] The most serious limitations of my "local" solution are the following: On the one hand, if only a small number of communities adopt it, we could succeed in ensuring the biological survival of our species, but we will lose all our scientific, technological, and cultural achievements. On the other hand, if the "run-away greenhouse" effect mentioned by Hansen (2009, p. 236) does indeed occur (this is far from certain, but the likelihood of such an event is proportionate with the total quantity of fossil fuels we decide to burn), we will perish in a few centuries, together with all the other forms of life on this planet. The climate of our planet will end up resembling the climate of the planet Venus.

[54] I am not excluding the possibility that some unforeseen combination of circumstances may lead to global mobilization on climate change. Nobody anticipated the fall of the Soviet Union or the "Arab Spring" of 2011. At the same time it remains to be seen if such a development materializes and if it happens while there is still time to take action on climate change.

[55] The co-operation between local organizations and higher levels of government in the context of community-based disaster preparedness (CBDP) is often difficult: "For instance, local concerns may be deemed 'too political' to tackle under a CBDP initiative, or fall within the sphere of 'development' and not 'disaster management'" (Allen, 2006, p. 88). Other difficulties stem from "the inclination [of disaster managers and donors] to concentrate on isolated small-scale local projects with little discussion of wider issues, and particularly the root causes of vulnerability" (Allen, p. 89). One can see here an interesting switch between local and (more) global priorities and levels of governance.